Instructions/Parts List

ELECTROSTATIC, FOR WATERBORNE COATINGS

PRO™ Auto Xs Air Spray Gun

309457G

EN

Part No. 244591, Series A

100 psi (0.7 MPa, 7 bar) Maximum Air Inlet Pressure

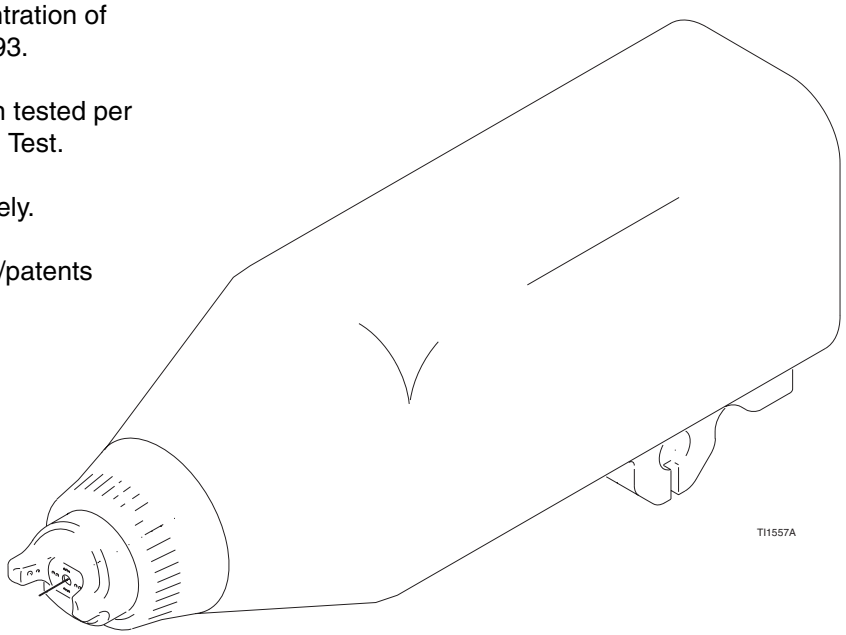
100 psi (0.7 MPa, 7 bar) Maximum Working Fluid Pressure

For use when electrostatically spraying conductive, waterborne fluids that meet at least one of the following conditions for non-flammability:

- The fluid has a flash point above 140°F (60°C) and a maximum organic solvent concentration of 20%, by weight, per ASTM Standard D93.
- The fluid does not sustain burning when tested per ASTM Standard D4206 Sustained Burn Test.

NOTE: Fluid hose must be ordered separately.

For patent information, see www.graco.com/patents



Important Safety Instructions
Read all warnings and instructions in this manual.
Save these instructions.

See page 2 for **Table of Contents.**

HO03

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Warnings

Warning Symbol

⚠ WARNING

This symbol alerts you to the possibility of serious injury or death if you do not follow the instructions.

Caution Symbol

⚠ CAUTION

This symbol alerts you to the possibility of damage to or destruction of equipment if you do not follow the instructions.

⚠ WARNING

Electric Shock Hazard

Improper grounding, setup, or usage of an isolated waterborne system can cause a hazardous condition and result in electric shock or other serious injury.

- Ground the equipment, all personnel in or close to the spray area, the object being sprayed, and all conductive objects in the spray area. See **Grounding**, page 18.
- The gun must be connected to a voltage isolation system that will discharge the system voltage when the gun is not in use.
- All components of the isolation system that are charged to high voltage must be contained within an enclosure that prohibits personnel from making contact with the high voltage components before the system voltage is discharged.
- The gun turbine air supply must be interlocked with the isolation system to shut off the turbine air supply anytime the isolation system enclosure is opened.
- The voltage isolation system must be interlocked with the spray area entrance to automatically discharge the voltage and ground the fluid whenever someone enters the spray area.
- The areas of the waterborne hose that are accessible to personnel must be covered by the conductive hose layer. The area of the hose that is not covered by the conductive hose layer must be inside the voltage isolation system enclosure.
- Only use the red-colored Graco grounded turbine air hose with this gun. Do not use the black or grey-colored air hoses.
- Install only one continuous Graco waterborne fluid hose between the isolated fluid supply and the spray gun. Do not splice hoses together.
- Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 when instructed to discharge the voltage; before cleaning, flushing, or servicing the system; before approaching the front of the gun; and before opening the enclosure for the isolated fluid supply.
- Do not enter a high voltage or hazardous area until all high voltage equipment has been discharged.
- Do not come within 2 ft (0.61 m) of the gun nozzle during gun operation or until you follow the **Fluid Voltage Discharge and Grounding Procedure**.
- Follow the warnings and instructions in the voltage system isolation system manual.

⚠ WARNING

Fire and Explosion Hazard

Improper grounding, poor air ventilation, open flames, or sparks can cause a hazardous condition and result in a fire or explosion.

- Electrostatic equipment must be used only by trained, qualified personnel who understand the requirements in this manual.
- Ground the equipment, all personnel in or close to the spray area, the object being sprayed, and all other electrically conductive objects in the spray area. See **Grounding**, page 18.
- Provide fresh air ventilation to avoid buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Interlock the gun air supply to prevent operation of the power supply unless ventilating fans are on. See **Ventilate the Spray Booth** on page 10.
- Do not flush with the gun electrostatics turned on.
- If there is any static sparking while using the equipment, **stop spraying immediately.** Identify and correct the problem.
- Eliminate all ignition sources such as pilot lights, cigarettes, and static arcs from plastic drop cloths. Do not plug in or unplug power cords or turn lights on or off in the spray area.
- Check gun resistance daily. See **Test Gun Resistance** on page 30.
- Only use this equipment to spray non-flammable, waterborne fluids, as defined on the front cover of this manual.
- Only flush, purge, or clean the electrostatic waterborne spray system with non-flammable fluids, as defined on the front cover of this manual.
- Keep the spray area free of debris and rags. Do not store solvent and flammable fluids in the spray area.
- Use only non-sparking tools to clean residue from the booth and hangers.

Toxic Fluid Hazard

Hazardous fluids or toxic fumes can cause a serious injury or death if splashed in the eyes or on the skin, swallowed, or inhaled.

- Know the specific hazards of the fluid you are using. Read the fluid manufacturer's warnings.
- Store hazardous fluid in an approved container. Dispose of the hazardous fluid according to all local, state, and national guidelines.
- Wear appropriate protective clothing, gloves, eyewear, and respirator.

⚠ WARNING

Equipment Misuse Hazard

Equipment misuse can cause the equipment to rupture, malfunction, or start unexpectedly and result in a serious injury.

- This equipment is for professional use only.
- Read all manuals, tags, and labels before operating the equipment.
- Use the equipment only for its intended purpose. If you are uncertain, call your Graco distributor.
- Do not alter or modify equipment. Use only genuine Graco parts and accessories.
- Do not operate the power supply above 60 kV. Use only Graco Part No. 244542 Power Supply with this gun.
- Check the equipment daily. Repair or replace worn or damaged parts immediately.
- Do not exceed the maximum working pressure of the lowest rated system component. Maximum working air and fluid pressure of this equipment is 100 psi (0.7 MPa, 7.0 bar).
- Use fluids and solvents that are compatible with the equipment wetted parts. See the **Technical Data** section of all equipment manuals. Read the fluid and solvent manufacturer's warnings.
- Route the hoses away from traffic areas, sharp edges, moving parts, and hot surfaces. Do not expose Graco hoses to temperatures above 180°F (82°C) or below -40°F (-40°C).
- Wear hearing protection when operating this equipment.
- Comply with all applicable local, state, and national fire, electrical, and other safety regulations.

Pressurized Equipment Hazard

Spray from the gun, hose leaks, or ruptured components can splash fluid in the eyes or on the skin and cause serious injury.

- Do not point the spray gun at anyone or at any part of the body.
- Do not stop or deflect fluid leaks with your hand, body, glove, or rag.
- Follow the **Pressure Relief Procedure**, page 21, when you stop spraying and before cleaning, checking, or repairing equipment.
- Check hoses and couplings daily. Replace worn, damaged, or loose parts immediately.
- Tighten all fluid connections before each use.

Introduction

How the Electrostatic Air Spray Gun Works

The automatic electrostatic air spray gun operates very similar to a traditional air spray gun. The atomization and fan air are emitted from the air cap. The atomization air breaks up the fluid stream and controls the droplet size. The fan air controls the shape and width of the spray pattern. The fan and atomization air can be adjusted independently.

Spraying Waterborne Fluids Electrostatically

⚠ CAUTION

The Graco warranty is void if the spray gun is connected to a non-Graco voltage isolation system or if the gun is operated above 60 kV.

This electrostatic air spray gun is designed to spray **only** waterborne fluids with a flash point above 140°F (60°C) and a maximum organic solvent concentration of 20%, by weight, per ASTM Standard D93. Also, the fluid must not sustain burning when tested per ASTM Standard D4206 Sustained Burn Test.

When connected to a voltage isolation system, all of the fluid in the spray gun, fluid hose, and isolated fluid supply is charged to high voltage, which means that the system has more electrical energy than a solvent-based system. Therefore, only non-flammable fluids (as defined on the front cover of this manual) can be sprayed with the system or be used to clean, flush, or purge the system.

Precautions must be taken when using electrostatic waterborne equipment to avoid potential shock hazards. When the spray gun charges the isolated fluid to high voltage, it is similar to charging a capacitor or a battery. The system will store some of the energy while spraying and retain some of that energy after the spray gun is shut off. It is not safe to touch the front end of the gun until the stored energy is discharged. The amount of time it takes to discharge the energy depends on the system design. Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 before approaching the front of the gun.

A safe, well designed voltage isolation system should have the following features:

- All components of the isolation system that are charged to high voltage must be contained within an enclosure that prohibits persons from making contact with the high voltage components before the system voltage is discharged.
- The voltage isolation system must be interlocked with the spray area entrance to automatically discharge the voltage and ground the fluid whenever someone opens the enclosure or enters the spray area.
- A bleed resistor to drain off the system voltage when the spray gun is not in use.
- The system should not have any severe arcing occurring when the isolation mechanism opens and closes. Severe arcing will shorten the life of the system components.

Gun Features and Options

- The gun is designed for use with a reciprocator, and can be mounted directly on a 1/2 in. (13 mm) rod. With additional brackets, the gun can be mounted for robotic applications.
- Gun functions are activated from a separate controller that sends the appropriate signal to the actuating solenoids.

- The optional fiber optic readout system can be installed to monitor the gun's spraying voltage. A fiber optic cable connected to the gun manifold carries the signal from the gun to a remote display module. Part No. 224117 Display Module displays the gun's spraying voltage and current. Battery-operated Display Module 189762 displays the gun's spraying voltage only.

⚠ WARNING

Electric Shock Hazard

To reduce the risk of electric shock, do not use the Graco ES Display Module readings to determine if your system is discharged. The display modules will only display the system voltage while the gun's power supply is operating. Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 to ensure the system is discharged.

Operating the Spray Function

Applying a minimum of 50 psi (0.35 MPa, 3.5 bar) air pressure to the gun manifold's cylinder air fitting (CYL) will retract the gun piston, which opens the air valves and a short time later opens the fluid needle. This provides the proper air lead and lag when triggering the gun. A spring returns the piston when the cylinder air is shut off.

Operating the Electrostatics

To operate the electrostatics, apply air pressure to the gun manifold's turbine air fitting (TA) through a Graco grounded air hose. The air enters the manifold and is directed to the inlet of the power supply turbine. The air spins the turbine, which then provides electrical power to the internal high voltage power supply. The fluid is charged by the spray gun electrode. The charged fluid is attracted to the nearest grounded object, wrapping around and evenly coating all surfaces.

The turbine air is exhausted into the shroud and out the back of the manifold through the exhaust fitting (EXH). The exhaust air helps keep contaminants out and helps keep the gun clean.

Changing the kV Setting

The gun's full voltage setting is 60 kV. Three lower voltage settings are possible by actuating the KV1 and KV2 switches. Supply 50 psi (0.35 MPa, 3.5 bar) air pressure to the KV1 and KV2 ports. Turn the air on or off as shown in Table 1 to set the desired voltage.

NOTE: The solenoid valves used to activate the KV1 and KV2 switches must bleed the air out of the lines for the switches to draw back to the higher voltage setting.

Table 1: Low Voltage Adjustment

1	2	kV
ON	ON	35
ON	OFF	40
OFF	ON	50
OFF	OFF	60

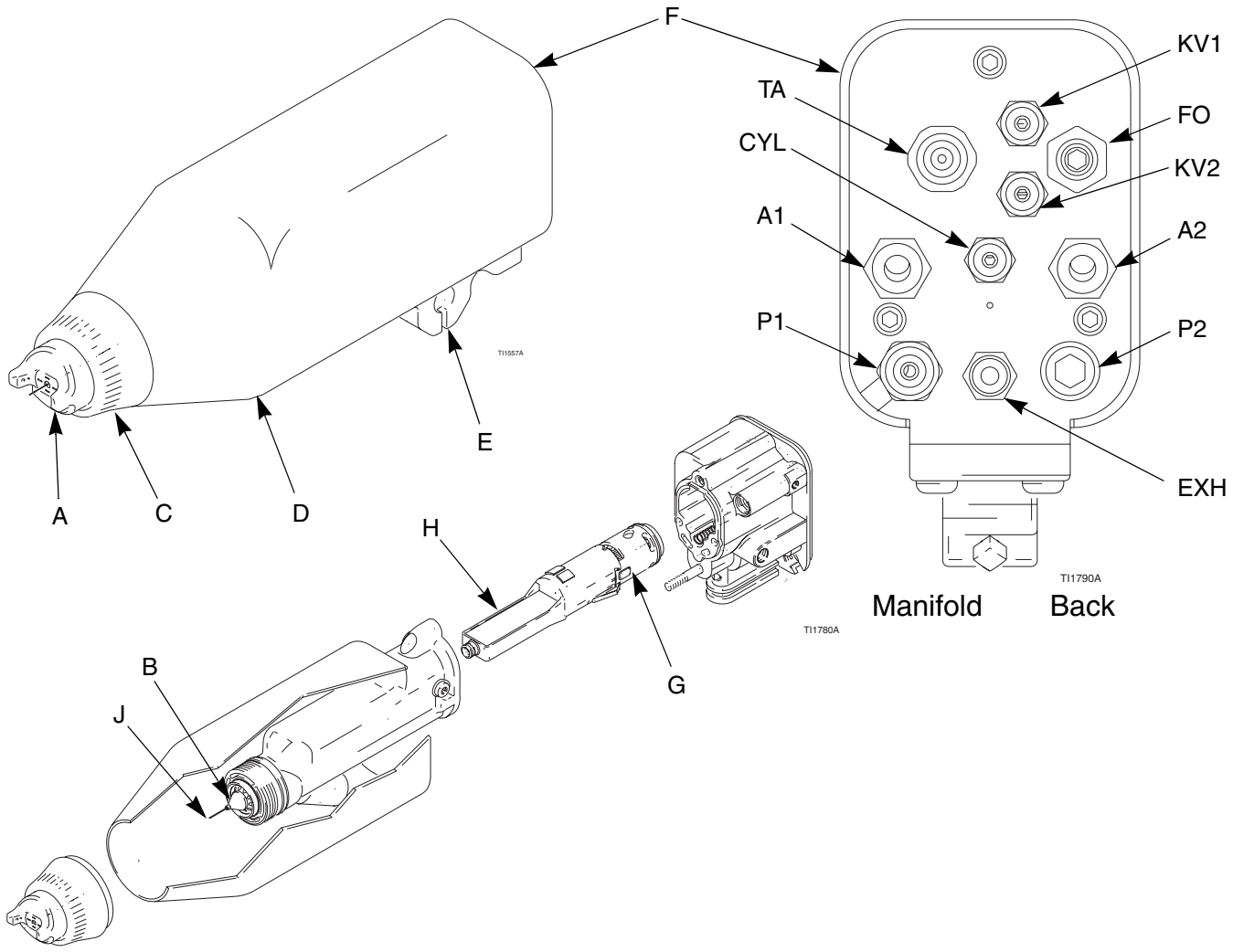


Fig. 1. Gun Overview
Key

A	Air Cap
B	Fluid Nozzle
C	Retaining Ring
D	Shroud
E	Mounting Bracket
F	Manifold
G	Turbine
H	Power Supply
J	Electrode

Manifold Markings

A1	Atomization Air Inlet Fitting
A2	Fan Air Inlet Fitting
CYL	Cylinder Air Inlet Fitting
EXH	Shroud Exhaust Outlet Fitting
FO	Fiber Optic Fitting (shipped unassembled)
KV1	kV Switch 1 Air Inlet
KV2	kV Switch 2 Air Inlet
P1	Fluid Supply Inlet Fitting
P2	Not Used
TA	Turbine Air Inlet Fitting

Installation

Install the System

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Installing and servicing this equipment requires access to parts which may cause electric shock or other serious injury if work is not performed properly.

- Do not install or service this equipment unless you are trained and qualified.
- Be sure your installation complies with all National, State and Local safety and fire codes, NFPA 33, NEC 504 and 516, and OSHA standard 1910.107.

FIG. 2. shows a typical electrostatic air spray system, and FIG. 3. shows possible system options. It is not an actual system design. For assistance in designing a system to suit your particular needs, contact your Graco distributor.

Basic Guidelines

When spraying waterborne fluids electrostatically:

- The gun must be connected to a voltage isolation system, which isolates the fluid supply from ground and allows voltage to be maintained at the tip of the gun.
- The gun must be connected to a voltage isolation system that will discharge the system voltage when the gun is not in use.
- All components of the isolation system that are charged to high voltage must be contained within a fence or enclosure that prohibits persons from making contact with the high voltage components before the system voltage is discharged.
- The gun turbine air supply must be interlocked with the isolation system to shut off the turbine air supply anytime the isolation system enclosure or safety fence is opened.
- The voltage isolation system must be interlocked with the spray area entrance to automatically discharge the voltage and ground the fluid whenever someone enters the spray area.
- The system should not have any severe arcing occurring when the isolation mechanism opens and closes. Severe arcing will shorten the life of the system components.

Graco Waterborne Fluid Hose

Use a Graco waterborne fluid hose between the voltage isolation system fluid outlet and the gun fluid inlet. See **Accessories** on page 56 for available hoses. The hose consists of an inner PTFE tube, a conductive layer covering the PTFE tube, and an outer cover.

If a hose failure occurs where high voltage arcs through the inner tube, voltage will be discharged to ground through the conductive hose layer. When properly installed, the conductive hose layer is grounded through its connection to the grounded enclosure.

Warning Signs

Mount warning signs in the spray area where they can easily be seen and read by all operators. An English Warning Sign is provided with the gun.

Ventilate the Spray Booth

⚠ WARNING

Flammable or Toxic Vapor Hazard

Provide fresh air ventilation to avoid the buildup of flammable or toxic vapors when spraying, flushing, or cleaning the gun. Do not operate the gun unless ventilation fans are operating.

Electrically interlock the gun turbine air supply (B) with the ventilators to prevent gun operation without ventilating fans operating. Check and follow all National, State, and Local codes regarding air exhaust velocity requirements.

NOTE: High velocity air exhaust will decrease the operating efficiency of the electrostatic system. The minimum allowable air exhaust velocity is 60 ft/minute (19 linear meters/minute).

Key to FIG. 2. and FIG. 3.

A	Air Hose Ground Wire
B	Graco Grounded Turbine Air Hose (TA)
C	Atomizing Air Hose, 3/8 in. (10 mm) OD (A1)
D	Fan Air Hose, 3/8 in. (10 mm) OD (A2)
E	Cylinder Air Hose, 5/32 in. (4 mm) OD (CYL)
F	Graco Waterborne Fluid Hose (P1)
G	To Isolated Fluid Supply System
H	Auto PRO Xs Air Spray Gun
J	Mounting Bracket for 1/2 in. (13 mm) rod
K	Solenoid Valve, requires quick exhaust port
L	Bleed-Type Master Air Valve
M	Air Pressure Regulator
N	True Earth Ground
P	24 Volt Power Supply
Q	4-20 microampere Outputs
R	Full Feature ES Display Module
S	kV Only ES Display Module (battery operated)
T	Fiber Optic Y Cable
U	Bulkhead
V	Fiber Optic Cable
W	Main Air Line
X	kV Switch Air Hose, 5/32 in. (4 mm) OD (optional; plug KV1 fitting if not used)
Y	kV Switch Air Hose, 5/32 in. (4 mm) OD (optional; plug KV2 fitting if not used)

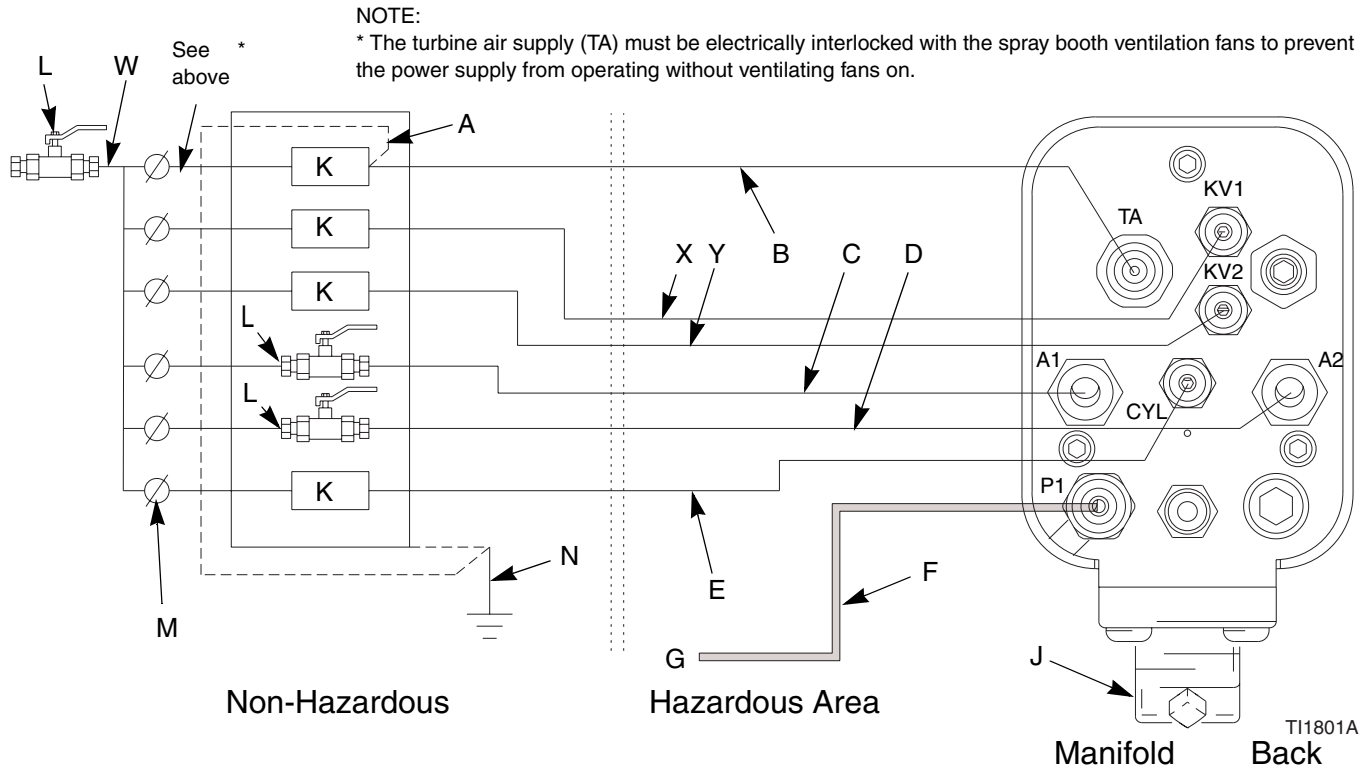
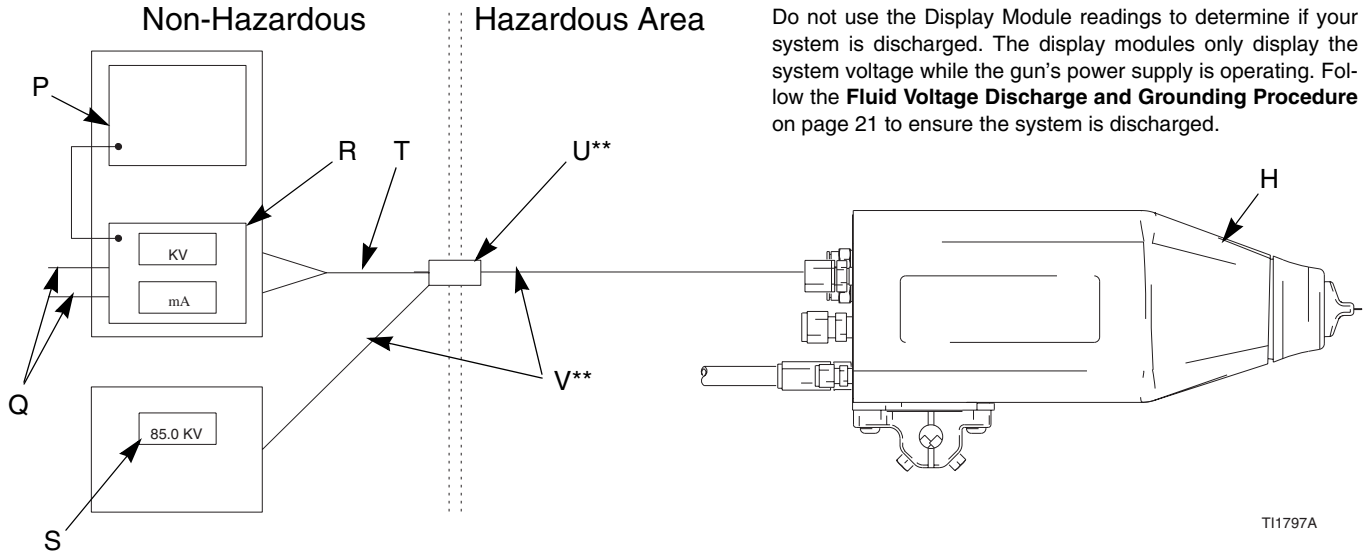


Fig. 2. Typical Installation

NOTE:

** A maximum of two splices with a total of 108 ft (33 m) of cable can be used. For the strongest light signals, use a minimum number of bulkhead splices. See **Accessories** on page 57.



Do not use the Display Module readings to determine if your system is discharged. The display modules only display the system voltage while the gun's power supply is operating. Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 to ensure the system is discharged.

Fig. 3. Optional Fiber Optic Connection to Voltage Display Module

Install the Air Line Accessories

1. Install a bleed-type air valve (L) on the main air line (W) to shut off all air to the gun (H).
2. Install an air line filter/water separator on the gun air line to ensure a dry, clean air supply to the gun. Dirt and moisture can ruin the appearance of your finished workpiece and can cause the gun to malfunction.
3. Install a bleed-type air regulator (M) on each of the air supply lines (B, C, D, E, X, Y) to control air pressure to the gun.
4. Install a solenoid valve (K) on the cylinder air line (E) to actuate the gun. The solenoid valve must have a quick exhaust port.

⚠ WARNING

Pressurized Equipment Hazard

Trapped air can cause the gun to spray unexpectedly, which can result in serious injury, including splashing fluid in the eyes or on the skin. The solenoid valves (K) must have a quick exhaust port so trapped air will be relieved between the valve and gun when the solenoids are shut off.

Install the Gun and Mounting Bracket

1. Loosen the mounting bracket's two set screws (103) and slide the bracket (102) onto a 1/2 in. (13 mm) mounting rod. See FIG. 4.
2. Position the gun and tighten the two set screws.

NOTE: For added positioning reliability, insert a 1/8 in. (3 mm) locating pin into the slot (NN) in the bracket and through a hole in the rod. See the detail in FIG. 4.

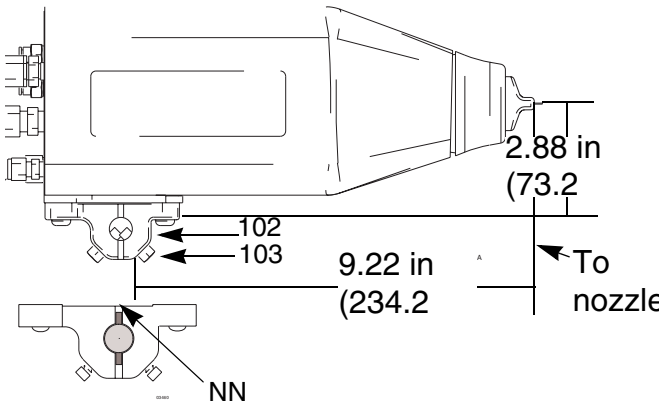


Fig. 4. Mounting Bracket

Connect the Air Line

FIG. 3. shows a schematic of air line connections, and FIG. 5. shows the manifold connections. Connect the air lines as instructed.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of a fire, explosion, or electric shock, the gun turbine air supply must be interlocked with:

- The isolation system to shut off the turbine air supply anytime the enclosure or safety fence is opened.
- The ventilators to prevent operation of the power supply unless the ventilating fans are on.

⚠ WARNING

Electric Shock Hazard

To reduce the risk of electric shock or other serious injury, you must use the red-colored Graco grounded air hose for the turbine air supply hose, and you must connect the hose ground wire to a true earth ground. Do not use the black or grey-colored Graco air hoses.

1. Connect the red-colored Graco Grounded Air Supply Hose (B) to the gun's turbine air inlet (TA) and connect the hose ground wire (A) to a true earth ground (N). The gun turbine air inlet fitting has left-hand threads to prevent connecting another type of air hose to the turbine air inlet. See **Accessories** on page 56 for further information about the hose.

2. Check the electrical grounding of the gun as instructed on page 19.

Manifold Connections

A1	**Atomization Air Inlet Fitting** Connect a 3/8 in. (10 mm) OD tube between this fitting and the air supply.
A2	**Fan Air Inlet Fitting** Connect a 3/8 in. (10 mm) OD tube between this fitting and the air supply.
CYL	**Cylinder Air Inlet Fitting** Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid. For quicker response, use the shortest hose length possible.
EXH	**Shroud Exhaust Outlet Fitting** Connect a 1/4 in. (6 mm) OD x 4 ft (1.22 m) long tube to this fitting.
FO	**Fiber Optic Fitting (Optional)** Connect the Graco Fiber Optic cable (see page 17).
KV1	**kV Switch 1 Air Inlet Fitting** Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid.
KV2	**kV Switch 2 Air Inlet Fitting** Connect a 5/32 in. (4 mm) OD tube between this fitting and the solenoid.
P1	**Fluid Supply Inlet** Connect a Graco waterborne fluid hose.
P2	**Not used.**
TA	**Turbine Air Inlet Fitting** Connect the red-colored Graco Grounded Air Hose between this fitting (left-hand thread) and the solenoid. Connect the air hose ground wire to a true earth ground.

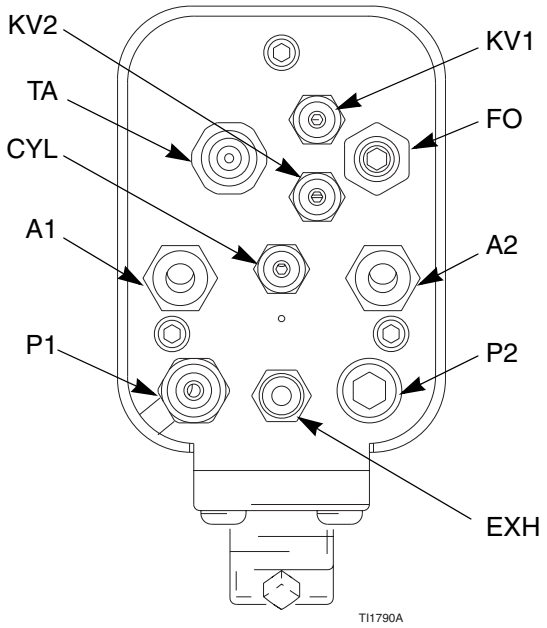


Fig. 5. Manifold Connections

Connect the Waterborne Fluid Hose

⚠ CAUTION

The Graco warranty is void if the spray gun is connected to a non-Graco voltage isolation system or if the gun is operated above 60 kV.

- Always use a Graco waterborne fluid hose between the voltage isolation system fluid outlet and the gun fluid inlet. See page 56 for available Graco waterborne hoses.
- Before connecting the waterborne fluid hose to the gun, blow it out with air and flush with water to remove contaminants.

⚠ WARNING

Electric Shock Hazard

To reduce the risk of electric shock, install only one continuous Graco waterborne hose between the isolated fluid supply and the gun. Do not splice hoses together.

1. Remove the air cap (3) and shroud (2). See page 41.
2. For the fluid hose to seal properly, it must be stripped and assembled to the dimensions shown in FIG. 6.. Push the inner tube (T) into the barrel fitting (F) until the tube bottoms. A new Graco waterborne fluid hose comes fully assembled to these dimensions.

⚠ CAUTION

Be careful not to cut into the inner tube (T) of the hose when stripping the hose. Nicks or cuts in the PTFE tube will cause premature hose failure.

Key to FIG. 6.

A	9.75 in. (248 mm)
B	1.5 in. (38 mm)

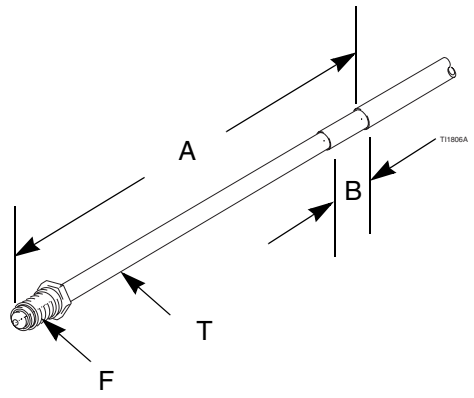
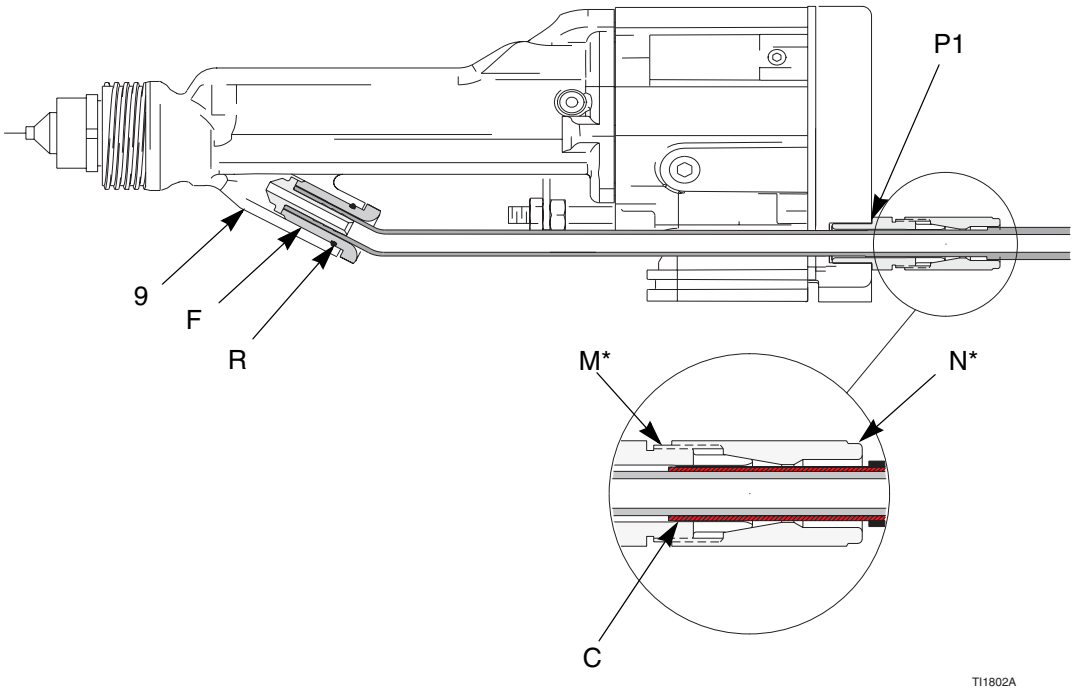
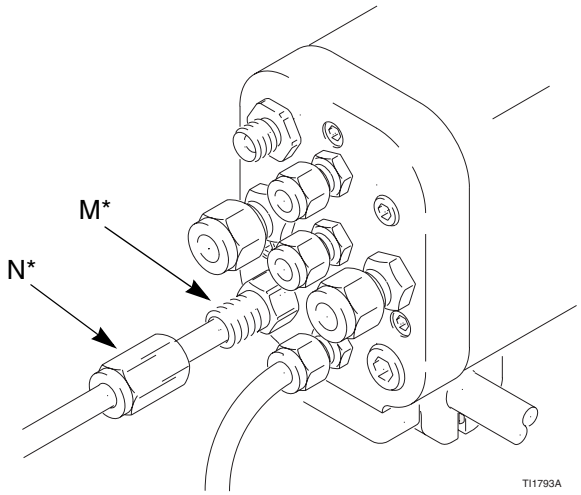


Fig. 6. Waterborne Hose Dimensions

3. Inspect the o-ring (R) on the barrel fitting (F) of the hose. Replace if worn or damaged. See FIG. 7..
4. Lubricate the o-ring (R) on the barrel fitting (F) with dielectric grease. Screw the fitting into the fluid inlet of the gun barrel (9) and tighten.
5. Unscrew the strain relief nut (N) from the hose ferrule (M) and slide the nut up the hose.





*Ferrule (M) and nut (N) are part of the waterborne hose assembly (purchase separately).

Fig. 7. Connect the Waterborne Fluid Hose

6. Slide the inner tube (T) of the hose through the slot and into the fluid inlet port (P1) of the manifold. Screw the hose ferrule (M) into the port.

⚠ WARNING

Electric Shock Hazard

To maintain grounding continuity, the conductive hose layer (C) must be engaged in the ferrule (M) when the nut (N) is tightened. Failure to properly install the hose in the fitting could result in an electric shock.

7. Screw the strain relief nut (N) onto the hose ferrule (M). Tighten to about 55 in-lb (6.2 N•m). Pull back on the hose to make sure it is secure.

8. Reinstall the shroud (2) and air cap (3).

9. Check the gun's electrical grounding (see page 19).

10. Connect the other end of the hose to the fluid outlet of the isolated fluid supply. See FIG. 8..

⚠ WARNING

Electric Shock Hazard

To reduce the risk of electric shock, the areas of the waterborne fluid hose that are accessible to personnel during normal operation must be covered by the outer hose jacket (J). The portion of the inner hose layer (T) not covered by the outer jacket must be inside the voltage isolation system enclosure (E).

The conductive hose layer (C) must be grounded through its connection to the isolation system's grounded enclosure (E).

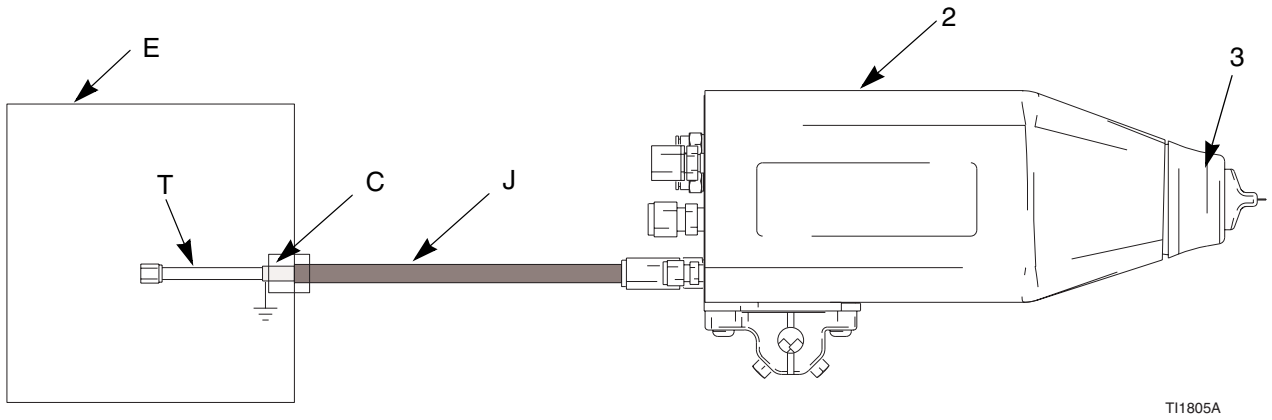


Fig. 8. Hose Connection at Isolated Fluid Supply

Optional Fiber Optic Cable Connection

⚠ WARNING

Electric Shock Hazard

To reduce the risk of electric shock, do not use the Graco ES Display Module readings to determine if your system is discharged. The display module will only display the system voltage while the gun's power supply is operating. Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 to ensure that the system is discharged.

An optional fiber optic fitting is shipped unassembled with the gun. If an ES (kV) display module is used, install the fitting in the FO port of the manifold. See FIG. 3., page 11, for a schematic of the fiber optic connections.

1. Remove the plug (120) from the fiber optic port, and install the fiber optic fitting (5, shipped loose with the gun). See FIG. 9..

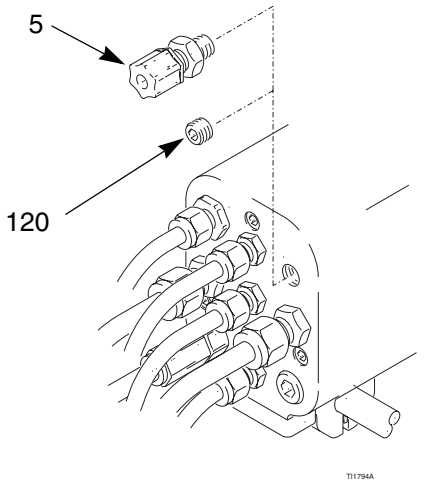


Fig. 9. Fiber Optic Fitting

2. Remove the nut (AA) from the fiber optic fitting (5) and slide the nut over the end of the fiber optic cable (BB). See FIG. 10..

3. Push the cable (BB) into the fitting (5) until it bottoms out. Tighten the nut (AA) to secure the cable.

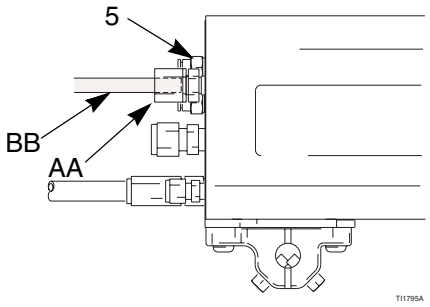


Fig. 10. Fiber Optic Cable

NOTE: Most of the fiber optic light transmission loss occurs at the bulkhead splices. For the strongest light signals, use a minimum number of bulkhead splices. A maximum of two splices, with a total of 108 ft (33 m) of cable, is recommended.

4. See manual 308265 to install a Graco ES Display Module.

Grounding

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

When operating the electrostatic gun, any ungrounded objects in the spray area (people, containers, tools, etc.) can become electrically charged. Improper grounding can result in static sparking, which can cause a fire, explosion, or electric shock. Follow the grounding instructions below.

The following are minimum grounding requirements for a basic electrostatic waterborne system. Your system may include other equipment or objects which must be grounded. Check your local electrical code for detailed grounding instructions. Your system must be connected to a true earth ground.

- *Electrostatic Air Spray Gun:* ground the gun by connecting the red-colored Graco Grounded Air Hose to the turbine air inlet and connecting the air hose ground wire to a true earth ground. See **Check Electrical Grounding,** page 19.
- *Graco Waterborne Fluid Hose:* the hose is grounded through the conductive layer. Install the hose as instructed on page 14.
- *Voltage Isolation System:* electrically connect to a true earth ground.
- *Air compressors and hydraulic power supplies:* ground the equipment according to the manufacturer's recommendations.
- *All air and fluid lines* must be properly grounded.
- *All electrical cables* must be properly grounded.
- *All persons entering the spray area:* shoes must have conductive soles, such as leather, or personal grounding straps must be worn. Do not wear shoes with non-conductive soles such as rubber or plastic.
- *Object being sprayed:* keep the workpiece hangers clean and grounded at all times. Resistance must not exceed 1 megohm.
- *The floor of the spray area:* must be electrically conductive and grounded. Do not cover the floor with cardboard or any non-conductive material which would interrupt grounding continuity.
- *Flammable liquids in the spray area:* must be kept in approved, grounded containers. Do not use plastic containers. Do not store more than the quantity needed for one shift.
- *All electrically conductive objects or devices in the spray area:* including fluid containers and wash cans, must be properly grounded.

Check Electrical Grounding

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Megohmmeter Part No. 241079 (AA-see FIG. 11.) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

- The gun has been removed from the hazardous area;
- Or all spraying devices in the hazardous area are turned off, ventilation fans in the hazardous area are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.

1. Have a qualified electrician check the electrical grounding continuity of the spray gun and turbine air hose.
2. Make sure the red-colored turbine air hose (B) is connected and the hose ground wire is connected to a true earth ground.
3. Turn off the air and fluid supply to the gun. The fluid hose must not have any fluid in it.
4. Measure the resistance between the turbine air inlet fitting (TA) and a true earth ground (N), using an ohmmeter. The resistance should not exceed 100 ohms.
5. If the resistance is greater than 100 ohms, check the tightness of the ground connections and be sure the turbine air hose ground wire is connected to a true earth ground. If the resistance is still too high, replace the turbine air hose.

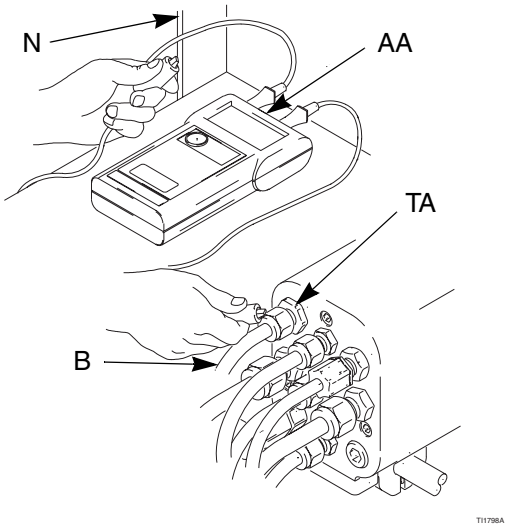


Fig. 11. Check Gun Grounding

Install the Fabric Cover

1. Install a fabric cover (XX) over the front of the gun and slide it back to cover the exposed tubing and hoses at the back of the manifold. See FIG. 12..
2. Route the exhaust tube (YY) outside the cover. This enables you to monitor the exhaust tube for the presence of any paint or solvent. See **Check for Fluid Leakage** on page 29. Strap down the exhaust tube to prevent it from moving around.

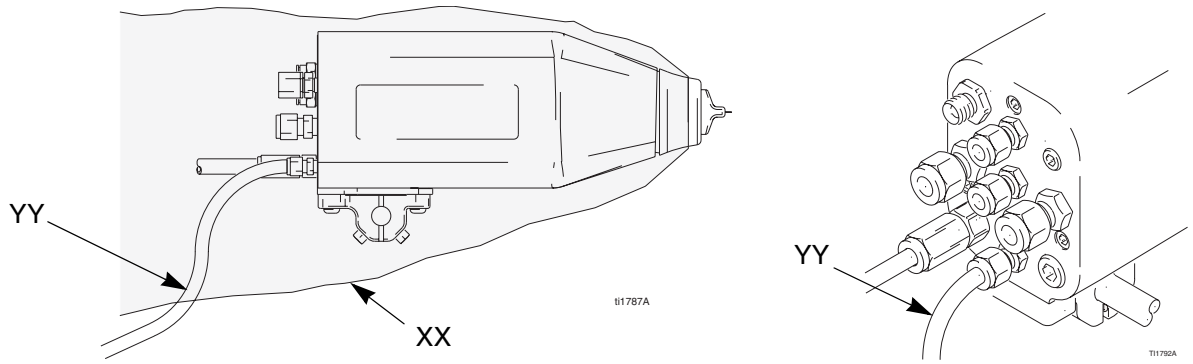


Fig. 12. Fabric Cover

Operation

Fluid Voltage Discharge and Grounding Procedure

⚠ WARNING

Electric Shock Hazard

The high voltage fluid supply is charged with high voltage until the voltage is discharged. Contact with the charged components of the isolation system or spray gun electrode will cause an electric shock. To avoid an electric shock, follow the **Fluid Voltage Discharge and Grounding Procedure**:

- when instructed to discharge the voltage
- before cleaning, flushing, or servicing the system equipment
- before approaching the front of the gun
- or before opening the safety fence or enclosure for the isolated fluid supply.

NOTE: An accessory grounding rod, part No. 210084, is available to discharge any voltage remaining on a system component. Contact your Graco distributor to order.

1. Turn off the turbine air to all spray guns connected to the isolated fluid supply.
2. Discharge the voltage at the voltage isolation system by following the procedure specified in the voltage isolation system instruction manual.
3. Touch the electrode of the gun with a grounded rod to make sure the voltage has been discharged. If you see an arc, verify that the electrostatics are turned off or see **Electrical Troubleshooting** on page 38 or the voltage isolation system manual for other possible problems. Resolve the problem before proceeding.

Pressure Relief Procedure

⚠ WARNING

Pressurized Equipment Hazard

The system pressure must be manually relieved to prevent the system from starting or spraying accidentally. To reduce the risk of an injury from electric shock, accidental spray from the gun, splashing fluid, or moving parts, follow the **Pressure Relief Procedure** whenever you:

- are instructed to relieve the pressure
- stop spraying
- check or service any of the system equipment
- or install or clean the fluid nozzle.

1. Follow the **Fluid Voltage Discharge and Grounding Procedure,** on page 21.
2. Relieve fluid pressure in the fluid supply and voltage isolation system as instructed in their instruction manuals.
3. Turn off all the air to the spray gun except the cylinder air, which triggers the gun. If an air pilot fluid regulator is used in the system, air pressure is also needed at the regulator air inlet.

NOTE: The air shut-off device must bleed the air out of the system.

4. Trigger the gun into a grounded metal waste container to relieve the fluid pressure.
5. Turn off all remaining air supplies to the gun.
6. Turn off the main air supply by closing the bleed-type master air valve on the main air supply line. Leave the valve closed until you are ready to spray again.

Operating Checklist

Check the following list daily, before starting to operate the system, to help ensure you of safe, efficient operation.

- ☐ All operators are properly trained to safely operate an automatic electrostatic waterborne air spray system as instructed in this manual.
- ☐ All operators are trained in the **Fluid Voltage Discharge and Grounding Procedure** on page 21.
- ☐ All operators are trained in the **Pressure Relief Procedure.**
- ☐ The warning sign provided with the gun is mounted in the spray area where it can be easily seen and read by all operators.
- ☐ The system is thoroughly grounded and the operator and all persons entering the spray area are properly grounded. See **Grounding** on page 18.
- ☐ The condition of the gun's electrical components has been checked as instructed in **Electrical Tests** on page 30.
- ☐ All fluid hose connections are tight.
- ☐ Ventilation fans are operating properly.
- ☐ Workpiece hangers are clean and grounded.
- ☐ All debris, including flammable fluids and rags, is removed from the spray area.
- ☐ All conductive objects in the spray area are electrically grounded and the floor of the spray area is electrically conductive and grounded.
- ☐ The manifold exhaust tubes have been checked for the presence of any fluid as instructed in **Check for Fluid Leakage** on page 29.

Select a Fluid Nozzle and Air Cap

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 21 before removing or installing a fluid nozzle and/or air cap.

The gun is supplied with Part No. 197266 Nozzle and 24A276 Air Cap. If you require a different size, refer to Table 2 and Table 3 , and instruction manual 309419, or consult with your Graco distributor. See **Air Cap/Nozzle Replacement** on page 41.

A wide pattern kit (P/N 24A431) is included with the gun and if installed, will provide more fan air for wider spray patterns. (If pattern becomes split, use the fan air valve to reduce the amount of fan air.)

Table 2: Fluid Nozzles

Part No.	Size, mm (in.)	Part No.	Size, mm (in.)
197263	0.75 (.030)	197266	1.5 (.055)
197264	1.0 (.042)	197267	1.8 (.070)
197265	1.2 (.047)	197268	2.0 (.080)

Table 3: Air Caps

Part No.	Pattern Shape and Length in. (mm)	Recommended Fluids and Production Rates
24A438	Round end; 15-17 (381-432)	Light to medium viscosity. Up to 15 oz/min (450 cc/min)
24A279	Round end; 14-16 (356-406)	Medium to high viscosity and high solids. Up to 15 oz/min (450 cc/min)
24A376*	Tapered end; 17-19 (432-483)	Light to medium viscosity. Up to 15 oz/min (450 cc/min)
24A274	Tapered end; 12-14 (305-356)	Light to medium viscosity. Up to 15 oz/min (450 cc/min)
24A439	Round end; 11-13 (279-330)	Medium to high viscosity and high solids. Up to 15 oz/min (450 cc/min) For use with 2.0 mm nozzle.

* Also available in the following colors: 24A276 - blue, 24A277 - red, 24A278 - green

Adjust the Spray Pattern

Follow the steps below to establish the correct fluid flow and air flow. **Do not** turn on the turbine air (TA) yet.

⚠ WARNING

Fire and Explosion Hazard

To reduce the risk of fire and explosion, only use this equipment with fluids that meet at least one of the following conditions for non-flammability:.

- The fluid has a flash point above 140°F (60°C) and a maximum organic solvent concentration of 20%, by weight, per ASTM Standard D93.
- The fluid does not sustain burning when tested per ASTM Standard D4206 Sustained Burn Test.

⚠ WARNING

Electric Shock Hazard

Contact with the charged components of the spray gun will cause an electric shock. Do not touch the gun nozzle or electrode or come within 2 ft (0.61 m) of the front of the gun during operation or until performing the **Fluid Voltage Discharge and Grounding Procedure** on page 21.

Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 when you stop spraying and whenever you are instructed to discharge the voltage.

⚠ WARNING

Component Rupture Hazard

To reduce the risk of component rupture, which can cause serious injury, do not exceed the maximum working pressure of the lowest rated system component. This equipment has a 100 psi (0.7 MPa, 7 bar) maximum working air and fluid pressure.

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 21 whenever you are instructed to relieve the pressure.

1. Discharge the system voltage (page 21).
2. Relieve the pressure (page 21).
3. Loosen the air cap retaining ring, and rotate the air cap for a vertical or horizontal spray pattern. See FIG. 13.. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.

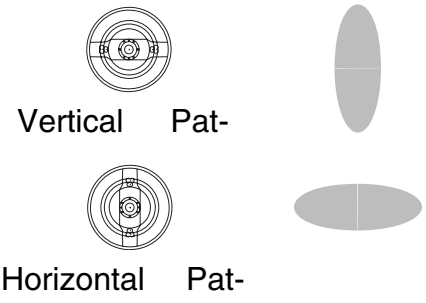


Fig. 13. Air Cap Positions

4. Adjust the fluid flow with the fluid pressure regulator. Refer to instruction manual 309419 to set the fluid pressure for various fluid flows, according to the size of the fluid nozzle being used.

5. Use the air pressure regulator on the atomization air supply line (A1) to adjust the degree of atomization. See FIG. 14.. For example, for a fluid flow rate of 10 ounces per minute (0.3 liters per minute), a typical atomization pressure would be 20-30 psi (1.4-2.1 bar, 0.14-0.21 MPa) at the gun manifold.

6. Use the air pressure regulator on the fan air supply line (A2) to adjust the pattern size.
   - For the most efficiency, always use the lowest air pressure possible.
   - When increasing to a wide, flat pattern, it may be necessary to increase the supply of fluid to the gun to maintain the same amount of coverage over a large area.
   - See **Spray Pattern Troubleshooting** on page 36 to correct spray pattern problems.

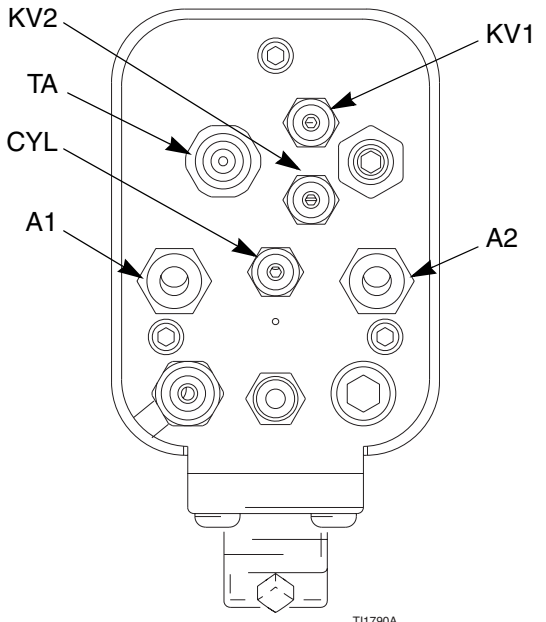


Fig. 14. Manifold Air Connections

Adjust the Electrostatics

1. Shut off the fluid supply.

2. Prepare the isolation system for high voltage operation.

3. Trigger the gun, then turn on the turbine air (TA). See FIG. 14..

4. Refer to Table 4 to set the proper pressure at the turbine air hose inlet *when air is flowing*. Do not exceed these pressures as there is no added benefit and turbine life could be reduced.

Table 4: Turbine Air Pressures

Turbine Air Hose Length ft (m)	**Air pressure at turbine air hose inlet for full voltage** psi (bar, MPa)
15 (4.6)	54 (3.8, 0.38)
25 (7.6)	55 (3.85, 0.38)
36 (11)	56 (3.9, 0.39)
50 (15.3)	57 (4.0, 0.40)
75 (22.9)	59 (4.1, 0.41)
100 (30.5)	61 (4.3, 0.43)

5. Check the voltage output of the gun using a high voltage probe and meter or by reading the ES (kV) Display Module.

NOTE: The gun's normal high voltage reading is 45-55 kV.

See **Electrical Troubleshooting** on page 38 to correct voltage problems.

Spraying

⚠ WARNING

Electric Shock Hazard

To reduce the risk of electric shock, do not touch the gun electrode or come within 2 ft (6.1 m) of the nozzle during gun operation.

1. Apply a minimum of 50 psi (3.5 bar, 0.35 MPa) air pressure to the cylinder air fitting (CYL) to activate the on/off sequence of atomization air (A1), fan air (A2), and fluid (P1). See FIG. 14..

2. Turn the gun functions on and off by using the air solenoid valves on the cylinder (CYL) and turbine (TA) air supply lines.

3. To change to a lower voltage setting, activate the solenoids controlling the KV1 and KV2 ports. See **Changing the kV Setting** on page 7.

⚠ WARNING

Fire and Explosion Hazard

If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage. See **Check for Fluid Leakage** on page 29.

Triggering the Fluid Alone

1. Shut off and relieve the air pressure to the atomization (A1) and fan (A2) air lines, using the bleed-type air shutoff valves.

2. Apply 50 psi (3.5 bar, 0.35 MPa) air pressure to the cylinder air fitting (CYL) to trigger the fluid.

Shutdown

1. Discharge the system voltage (page 21).

2. Flush and clean the equipment. See **Maintenance** on page 26.

3. Relieve the pressure (page 21).

Maintenance

Daily Care and Cleaning

<table>
<tr><th colspan="2">⚠ CAUTION</th></tr>
<tr><td>

- Clean all parts with a non-conductive, compatible solvent. Conductive solvents can cause the gun to malfunction.
- Do not use methylene chloride as a flushing or cleaning solvent with this gun as it will damage nylon components.
- Fluid in the air passages could cause the gun to malfunction and could draw current and reduce the electrostatic effect. Fluid in the power supply cavity can reduce the alternator life. Whenever possible, point the gun down when cleaning it. Do not use any cleaning method which could allow fluid into the gun air passages.

</td><td>

Do not immerse the gun in fluid.

</td></tr>
<tr><td>

Do not point the gun up while cleaning it.

</td><td>

Do not wipe the gun with a cloth that is heavily saturated; wring out the excess fluid.

</td></tr>
</table>

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 21 before doing any maintenance on the gun or system.

- Clean the fluid and air line filters daily.
- Clean the outside of the gun daily with a soft cloth dampened in a compatible solvent.
- Clean the air cap and fluid nozzle daily, minimum. Some applications require more frequent cleaning. Replace the fluid nozzle and air cap if they are damaged. See **Clean the Air Cap and Fluid Nozzle**, page 28.
- Check the electrode and replace if broken or damaged. See **Electrode Replacement** on page 42.
- Check for fluid leakage from the gun and fluid hoses. See **Check for Fluid Leakage** on page 29. Tighten fittings or replace equipment as needed.
- Flush the gun before changing colors and whenever you are done operating the gun.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of fire, explosion, or electric shock, turn off the turbine air (TA) before flushing the gun or any part of the system.

Clean the Air Cap and Fluid Nozzle

Equipment Needed

- soft bristle brush
- compatible solvent

Procedure

1. Discharge the system voltage, page 21.
2. Relieve the pressure, page 21.
3. Remove the air cap assembly (1, 3) and shroud (2). See FIG. 15..
4. Wipe the fluid nozzle (4), shroud (2), and exterior of the gun clean with a cloth dampened in non-flammable solvent. Avoid getting any solvent into the air passages. Whenever possible, point the gun down when cleaning it.
5. If it appears that there is fluid inside the fluid nozzle (4) air passages, remove the gun from the line for servicing.
6. Clean the air cap (3) with the soft bristle brush and solvent or submerge the air cap in suitable solvent and wipe it clean.

⚠ CAUTION

Do not use metal tools to clean the air cap or fluid nozzle holes as this could scratch them, and make sure the electrode is not damaged. Scratches in the air cap or nozzle or a damaged electrode can distort the spray pattern.

7. Slide the shroud (2) onto the gun.
8. Carefully install the air cap (3). Be sure to insert the electrode (7) through the center hole of the air cap. Rotate the air cap to the desired position.
9. Make sure the u-cup (1a) is in place on the retaining ring (1). The lips must face forward. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.
10. Test gun resistance, page 30.

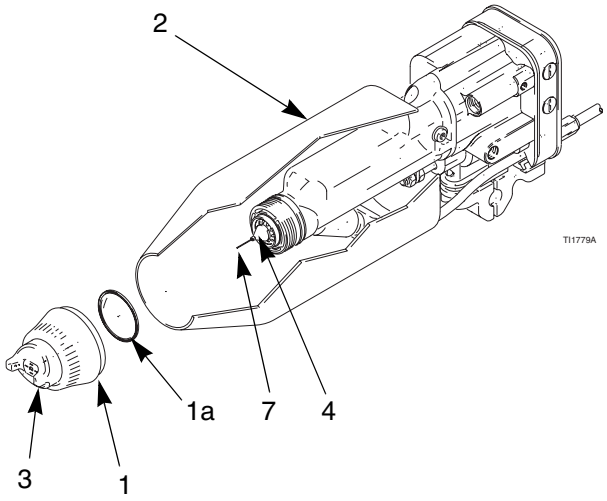


Fig. 15. Clean Air Cap and Fluid Nozzle

Check for Fluid Leakage

⚠ WARNING

Fire and Explosion Hazard

If any fluid leakage from the gun is detected, stop spraying immediately. Fluid leakage into the gun shroud could cause fire or explosion and result in serious injury and property damage.

During operation, periodically check the manifold exhaust tube (YY) and both ends of the gun shroud (ZZ) for the presence of fluid. See FIG. 16.. Fluid in these areas indicates leakage into the shroud, which could be caused by leaks at the fluid tube connections or fluid packing leakage.

If fluid is seen in these areas, stop spraying immediately. Discharge the voltage (page 21), relieve the pressure (page 21), and then remove the gun for repair.

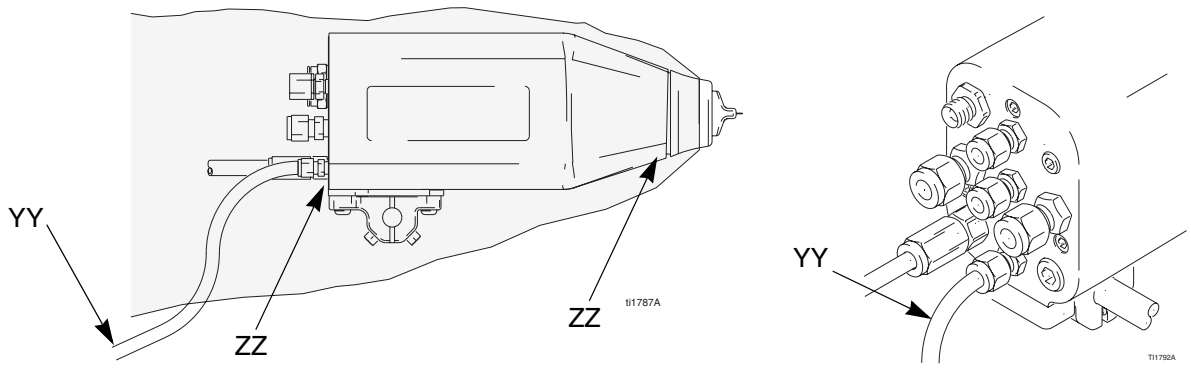


Fig. 16. Check for Fluid Leakage

Electrical Tests

Electrical components inside the gun affect performance and safety. The following procedures test the condition of the power supply (12) and electrode (7), and electrical continuity between components.

Use megohmmeter Part No. 241079 (AA) and an applied voltage of 500 V. Connect the leads as shown.

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

Megohmmeter Part No. 241079 (AA-see FIG. 17.) is not approved for use in a hazardous area. To reduce the risk of sparking, do not use the megohmmeter to check electrical grounding unless:

- The gun has been removed from the hazardous area;
- Or all spraying devices in the hazardous area are turned off, ventilation fans in the hazardous area are operating, and there are no flammable vapors in the area (such as open solvent containers or fumes from spraying).

Failure to follow this warning could cause fire, explosion, and electric shock and result in serious injury and property damage.

Test Gun Resistance

1. Flush and dry the fluid passage.

2. Measure resistance between the electrode needle tip (7) and the turbine air inlet fitting (TA); it should be 117-137 megohms. If outside this range, remove the gun for service (page 39) and go to the next test. If in range, refer to **Electrical Troubleshooting** on page 38 for other possible causes of poor performance.

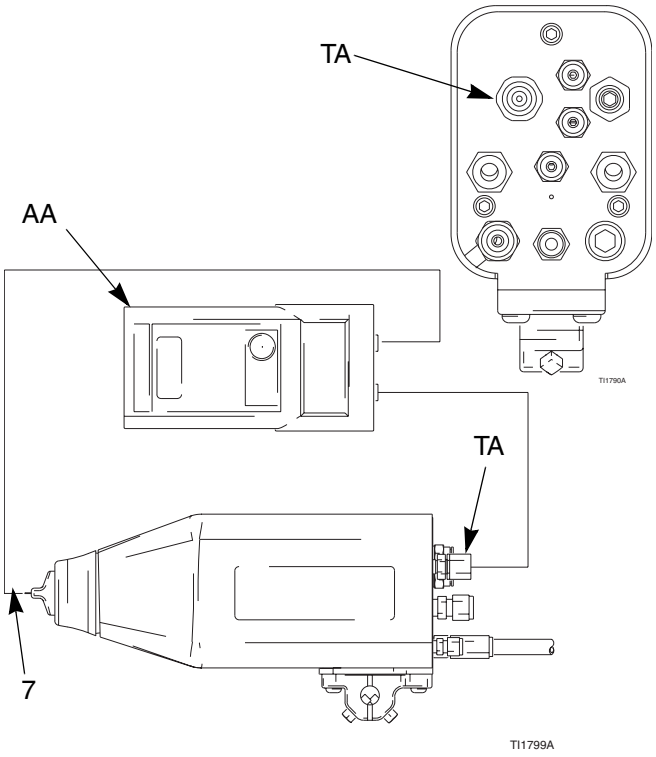


Fig. 17. Test Gun Resistance

Test Power Supply Resistance

1. Remove the power supply (12), page 49.

2. Remove the turbine alternator (13) from the power supply, page 50.

3. Measure resistance from the power supply's ground strips (EE) to the spring (12b). See FIG. 18..

4. The resistance should be 95-105 megohms. If outside this range, replace the power supply. If in range, proceed to the next test.

5. If you still have problems, refer to **Electrical Troubleshooting** on page 38 for other possible causes of poor performance, or contact your Graco distributor.

6. Be sure the spring (12b) is in place before reinstalling the power supply.

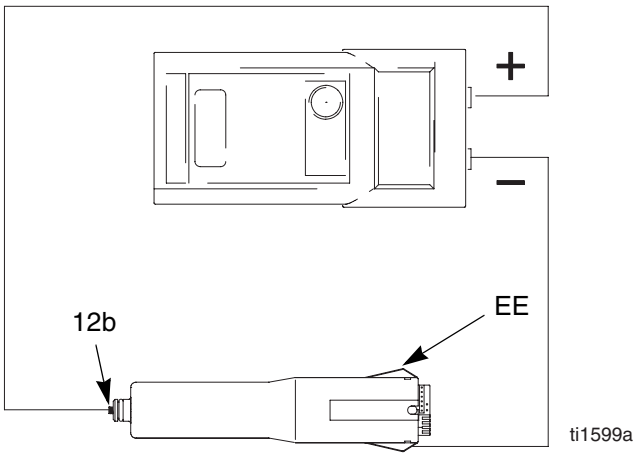


Fig. 18. Test Power Supply Resistance

Test Electrode Resistance

1. Insert a conductive rod (B) into the gun barrel (removed for the power supply test) and against the metal contact (C) in the front of the barrel.

2. Measure the resistance between the conductive rod (B) and the electrode (7). The resistance should be 20-30 megohms. See FIG. 19..

3. If in range, refer to **Electrical Troubleshooting** on page 38 for other possible causes of poor performance, or contact your Graco distributor.

4. Remove the electrode (7), page 42. Measure the resistance between the contact (E) and the electrode wire (F). The resistance should be 20-30 megohms. If out of range, replace the electrode. See FIG. 20..

5. Make sure the metal contact (C) in the barrel, the nozzle contact ring (4a, FIG. 21.), and the electrode contacts (E) are clean and undamaged.

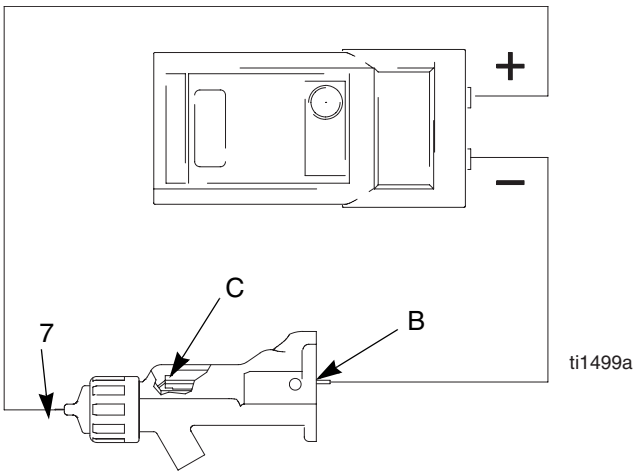


Fig. 19. Test Electrode Resistance

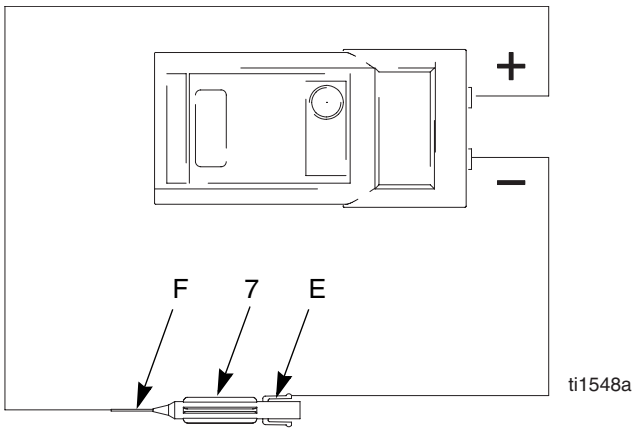


Fig. 20. Electrode

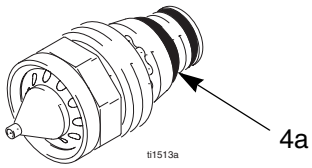


Fig. 21. Nozzle Conductive O-Ring

Troubleshooting

⚠ WARNING

Electric Shock Hazard

Installing and servicing this equipment requires access to parts which may cause an electric shock or other serious injury if the work is not performed properly. Do not install or repair this equipment unless you are trained and qualified.

Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 before checking or servicing the system and whenever you are instructed to discharge the voltage.

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of an injury, follow the **Pressure Relief Procedure** on page 21 before checking or servicing any part of the system and whenever you are instructed to relieve the pressure.

Voltage Loss Troubleshooting

Normal spraying voltage for a system using the waterborne gun is 45-55 kV. The system voltage is lower due to spraying current demands and voltage isolation system losses.

A loss of spraying voltage can be caused by a problem with the spray gun, fluid hose, or voltage isolation system, since all of the system components are electrically connected through the conductive, waterborne fluid.

Before troubleshooting or servicing the voltage isolation system itself, you need to determine which component in the system is most likely causing a problem. Possible causes include the following:

Spray Gun

- Fluid leakage
- Dielectric breakdown at the fluid hose connection or fluid packings
- Not enough air pressure for the turbine
- Faulty power supply
- Excessive overspray on gun surfaces
- Fluid in the air passages

Waterborne Fluid Hose

- Dielectric failure of hose (pin-hole leak through PTFE layer)
- Air gap in the fluid column between the gun and isolated fluid supply, causing a low voltage reading on the isolation system voltage meter.

Voltage Isolation System

- Fluid leakage
- Dielectric breakdown of hoses, seals, or connections
- Isolators not functioning properly

Visual Check

First, check the system for any visible faults or errors to help isolate whether the spray gun, fluid hose or voltage isolation system has failed. A voltage probe and meter, part no. 236003, is helpful for diagnosing voltage problems and is required for some of the troubleshooting tests that follow.

1. Check that all of the air and fluid tubes and hoses are properly connected.
2. Check that the voltage isolation system valves and controls are properly set for operation.
3. Check that the spray gun and voltage isolation system have sufficient air pressure.
4. Check that the gun turbine air (TA) is turned on and the pressure is set correctly.
5. Check that the voltage isolation system's enclosure door is closed and that any safety interlocks are engaged and working properly.
6. Make sure the voltage isolation system is in the “isolate” mode, where it is isolating the fluid voltage from ground.
7. To eliminate air gaps in the fluid column, spray enough fluid to purge the air out between the voltage isolation system and the spray gun. An air gap in the fluid hose can break the electrical continuity between the spray gun and the isolated fluid supply and cause a low voltage reading on a voltage meter connected to the isolated fluid supply.
8. Check the spray gun cover and barrel for accumulated overspray. Excessive overspray can create a conductive path back to the grounded gun. Install a new gun cover and clean the exterior of the gun.
9. Inspect the entire system for any visible fluid leakage and repair any fluid leaks that are found. Pay special attention to the following areas:
   - Packing area of the spray gun
   - Fluid hose: check for leakage or any bulges in the outer cover, which may indicate an internal leak
   - Internal voltage isolation system components

Tests

If you still have no voltage, separate the spray gun and hose from the voltage isolation system and check whether the gun and hose alone will hold voltage with the following test.

1. Flush the system with water and leave the lines filled with water.
2. Discharge the system voltage (page 21).
3. Relieve the pressure (page 21).
4. Disconnect the fluid hose from the voltage isolation system.

   Avoid allowing any water to leak out of the fluid hose as that could cause a significant air gap in the fluid column up to the gun electrode, which can break the conductivity path and conceal a potential failure area.
5. Position the end of the hose as far as possible away from any grounded surface. The end of the hose must be at least 1 ft. (0.3 m) from any ground. Make sure that no one is within 3 ft. (0.9 m) of the end of the hose.
6. Turn the turbine air to the gun on. Measure the voltage at the gun electrode with a voltage probe and meter.
7. Discharge the system voltage by waiting 30 seconds and then touching the gun electrode with a grounded rod.
8. If the meter reading is 45 to 55 kV, the gun and fluid hose are okay, and the problem is in the voltage isolation system.

   If the reading is below 45 kV, the problem is in the gun or fluid hose.
9. Flush the fluid hose and gun with enough air to dry out the fluid passages.
10. Turn the turbine air to the gun on. Measure the voltage at the gun electrode with a voltage probe and meter.

11. If the meter reading is 55-60 kV, the gun power supply is okay, and there is probably a dielectric breakdown somewhere in the fluid hose or gun. Continue with step 12.

    If the reading is below 55 kV, do the electrical tests on page 30 to check the gun and power supply resistance. If those tests show the gun and power supply are okay, continue with step 12.

12. A dielectric breakdown is most likely in one of the following three areas. Repair or replace the component that is failing.

    - Fluid hose

      Check for leakage or any bulges in the outer cover, which may indicate a pin-hole leak through the PTFE layer. Disconnect the fluid hose from the gun, and look for signs of fluid contamination on the outside of the PTFE portion of the fluid tube.

      Inspect the end of the hose connected to the voltage isolation system. Look for cuts or nicks.

      Make sure the hose is properly stripped. Restrip or replace the hose.

    - Fluid packings

      Remove the packing assembly from the gun as instructed on page 43, and look for signs of fluid leakage or any blackened areas, which would indicate arcing is occurring along the packing rod.

    - Fluid hose connection joint to the spray gun

      A breakdown at the fluid hose connection joint would be caused by fluid leaking past the o-ring seals on the end of the hose. Remove the hose at the gun connection and look for signs of fluid leakage along the PTFE tube.

13. Before reassembling the gun, clean and dry the gun fluid inlet tube. Repack the inner spacer of the fluid packing rod with dielectric grease and reassemble the gun.

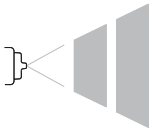
14. Reconnect the fluid hose.

15. Check the gun voltage with the voltage probe and meter before filling the gun with fluid.

Spray Pattern Troubleshooting

NOTE: Check all possible remedies in the Troubleshooting Chart before disassembling the gun.

NOTE: Some spray pattern problems are caused by the improper balance between air and fluid.

Problem	Cause	Solution
Fluttering or spitting spray. 	No fluid.	Refill supply.
	Loose, dirty, damaged nozzle/seat.	Clean or replace nozzle, page 41.
	Air in fluid supply.	Check fluid source. Refill.
Improper spray pattern.	Damaged nozzle or air cap.	Replace, page 41.
	Fluid buildup on air cap or nozzle.	Clean. See page 28.
	Fan air pressure too high.	Decrease.
	Fluid too thin.	Increase viscosity.
	Fluid pressure too low.	Increase.
	Fan air pressure too low.	Increase.
	Fluid too thick.	Reduce viscosity.
	Too much fluid.	Decrease flow.
Streaks.	Did not apply 50% overlap.	Overlap strokes 50%.
	Dirty or damaged air cap.	Clean or replace, page 41.

Gun Operation Troubleshooting

Problem	Cause	Solution
Excessive spray fog.	Atomizing air pressure too high.	Decrease air pressure as low as possible.
	Fluid too thin.	Increase viscosity.
“Orange Peel” finish.	Atomizing air pressure too low.	Increase air pressure; use lowest air pressure necessary.
	Poorly mixed or filtered fluid.	Remix or refilter fluid.
	Fluid too thick.	Reduce viscosity.
Fluid leaks from the fluid packing area	Worn packings or rod.	Replace packings or rod; see pages 43 or 44.
Air leaks from the air cap	Worn piston stem o-rings (34e, 34f).	Replace; see page 45.
Fluid leakage from the front of the gun	Worn or damaged packing rod (8).	Replace; see page 43
	Worn fluid seat.	Replace fluid nozzle (4) and/or electrode needle (7); see pages 41 to 42.
	Loose fluid nozzle (4).	Tighten; see page 41.
	Damaged nozzle o-ring (4b).	Replace; see page 41.
Gun does not spray	Low fluid supply.	Add fluid if necessary.
	Damaged air cap (3).	Replace; see page 41.
	Dirty or clogged fluid nozzle (4).	Clean; see page 41.
	Damaged fluid nozzle (4).	Replace; see page 41.
	Piston (34) not actuating.	Check cylinder air. Check piston u-cup (34d); see page 45.
	Actuator arm (29) is out of position.	Check actuator arm and nuts. See page 46.
Dirty air cap	Misaligned air cap (3) and fluid nozzle (4).	Clean fluid buildup off air cap and fluid nozzle seat; see page 28.
	Damaged nozzle orifice.	Replace nozzle (4); see page 41.
	Fluid is coming on before the air.	Check actuator arm and nuts. See page 46.
Air leaks from manifold	Manifold is not tight.	Tighten manifold screws (106).
Fluid leaks at the quick-disconnect.	Manifold is not tight.	Tighten manifold screws (106).
	Fluid hose o-rings are worn or missing.	Inspect or replace o-rings.
	Hose not seated properly.	Make sure the hose was stripped and installed correctly. See page 14.

Electrical Troubleshooting

Problem	Cause	Solution
Voltage still present at gun after following the **Fluid Voltage Discharge and Grounding Procedure**	Turbine air is not turned off.	Turn off.
	Did not wait long enough for voltage to discharge.	Wait longer before touching electrode with grounded rod. Check for bleed resistor failure.
	Air pocket in fluid line leaves fluid near gun isolated.	Determine cause and correct. Purge air from fluid line.
	Voltage isolation system failed.	Service voltage isolation system.
Poor wrap.	Turbine air is not turned on.	Turn on.
	Booth exhaust velocity is too high.	Reduce velocity to within code limits.
	Atomizing air pressure too high.	Decrease.
	Fluid pressure too high.	Decrease.
	Incorrect distance from gun to part.	Should be 8-12 in. (200-300 mm).
	Poorly grounded parts.	Resistance must be 1 megohm or less. Clean workpiece hangers.
	Faulty gun resistance.	See **Test Gun Resistance** on page 30.
	Low fluid resistivity.	Check fluid resistivity, page 20.
	Fluid leaks from the packing (8d) and causes a short.	Clean the packing rod cavity. Replace the packing rod. See page 44.
	Faulty turbine alternator.	Be sure the plug is in place on the back of the turbine alternator housing. Remove and test the turbine alternator. See page 50.
	The KV switch is stuck on low.	Check the switch actuation; replace if needed.
	No power.	Replace power supply. See page 49.
No voltage or low voltage reading on the gun ES display module	Damaged fiber optic cable or connection.	Check; replace damaged parts.
	Turbine air is not turned on.	Turn on.
	Poor wrap.	See causes and solutions under Poor Wrap, above.
Operator gets mild shock.	Operator not grounded or is near ungrounded object.	See **Grounding** on page 18.
	Gun not grounded.	See **Check Electrical Grounding** on page 19 and **Test Gun Resistance** on page 30.
Operator gets shock from workpiece.	Workpiece not grounded.	Resistance must be 1 megohm or less. Clean workpiece hangers.

Repair

Prepare the Gun for Service

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

To reduce the risk of a fire, explosion, or electric shock:

•Follow the **Fluid Voltage Discharge and Grounding Procedure** on page 21 before flushing, checking, or servicing the system and whenever you are instructed to discharge the voltage.

- Clean all the parts with a non-flammable solvent as defined on the front cover of this manual.
- Do not service this equipment unless you are trained and qualified.
- Do not come within 2 ft (0.6 m) of the gun nozzle during gun operation or until after following the **Fluid Voltage Discharge and Grounding Procedure.**

⚠ WARNING

Pressurized Equipment Hazard

To reduce the risk of injury, follow the **Pressure Relief Procedure** on page 21 before checking or servicing any part of the system and whenever you are instructed to relieve the pressure.

- Check all possible remedies in **Troubleshooting** before disassembling the gun.
- Use a vise with padded jaws to prevent damage to plastic parts.
- Lubricate the power supply o-ring (12a), some packing rod parts (8), and certain fluid fittings with Part No. 116553 Dielectric Grease, as specified in the text.
- Lightly lubricate o-rings and seals with non-silicone grease. Order Part No. 111265 Lubricant. Do not over-lubricate.
- Only use genuine Graco parts. Do not mix or use parts from other PRO Gun models.

1. Discharge the system voltage, page 21.
2. Flush and clean the gun, page 26.
3. Relieve the pressure, page 21.
4. Remove the gun from the manifold, page 40.
5. Remove the gun from the worksite. Repair area must be clean.

Remove the Gun from the Manifold

1. Discharge the system voltage, page 21.
2. Flush and clean the gun, page 26.
3. Relieve the pressure, page 21.
4. Remove the air cap (3) and shroud (2), page 41.
5. Disconnect the fluid hose fitting (F) from the gun barrel (9).
6. Loosen the bottom gun screw (31) until the gun sits loosely in the mounting bracket slot (A). See FIG. 22..

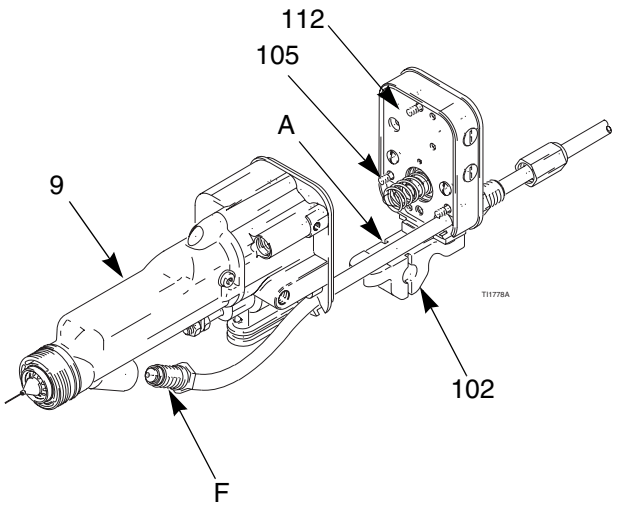


Fig. 22. Remove Gun from Manifold

⚠ CAUTION

The piston return spring (105) is compressed between the manifold and the gun body when they are assembled. To avoid sudden movement of the gun, loosen the bottom gun screw (31) before loosening the three manifold screws (106). This allows the gun to move forward gradually as the manifold screws are loosened. Hold the gun firmly in hand while loosening the manifold screws.

7. Holding the gun firmly in hand, loosen the three screws (106) from the back of the manifold.
8. Remove the gun from the manifold and take it to the service area.

Install the Gun on the Manifold

1. Make sure the gasket (112) and spring (105) are in place on the manifold. See FIG. 22.. Inspect the parts for damage and replace them as needed.
2. Secure the gun to the manifold by tightening the three screws (106).
3. Secure the gun to the mounting bracket (102) by tightening the bottom screw (31).
4. Make sure the fittings and barrel are clean and dry, then reconnect the waterborne fluid hose, page 14.
5. Reinstall the gun shroud (2) and air cap (3), page 41.

Air Cap/Nozzle Replacement

⚠ CAUTION

Hold the front end of the gun up and trigger the gun while removing the nozzle to help drain the gun and prevent any paint or solvent left in the gun from entering the air passages.

1. Prepare gun for service, page 39.

2. Remove the retaining ring (1) and air cap (3). See FIG. 23..

3. Point gun up while removing the fluid nozzle (4) assembly with the multi-tool (40).

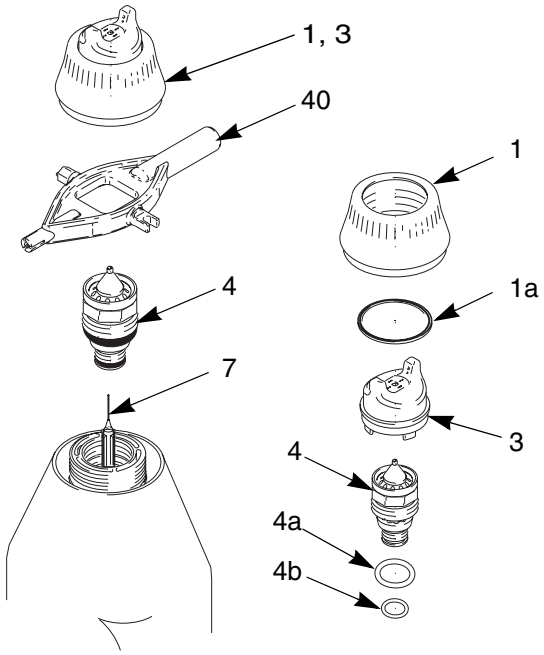


Fig. 23. Air Cap/Nozzle Replacement

⚠ WARNING

Fire, Explosion, and Electric Shock Hazard

The nozzle contact ring (4a) is a conductive contact ring, not a sealing o-ring. To reduce the risk of sparking or electric shock, do not remove the nozzle contact ring (4a) except to replace it and never operate the gun without the contact ring in place. Do not replace the contact ring with anything but a genuine Graco part.

NOTE: Use non-silicone grease, Part No. 111265, on the small o-ring (4b). Do not over-lubricate. Do not lubricate the contact ring (4a).

4. Lightly lubricate the o-ring (4b). Install it and the contact ring (4a) on the nozzle (4).

NOTE: Make sure the electrode needle (7) is finger-tight (page 42).

5. Install the fluid nozzle (4) with the multi-tool (40). Tighten until the fluid nozzle seats in the gun barrel (1/8 to 1/4 turn past hand-tight).

6. Carefully install the air cap (3). Be sure to insert the electrode (7) through the center hole of the air cap. Rotate the air cap to the desired position.

7. Make sure the u-cup (1a) is in place on the retaining ring (1). The lips must face forward. Tighten the retaining ring until the air cap is held firmly in place; you should not be able to rotate the air cap horns by hand.

8. Test gun resistance, page 30.

9. Install the gun onto the manifold and bracket. See page 40.

Electrode Replacement

1. Prepare the gun for service, page 39.

2. Remove the air cap and nozzle, page 41. Remove the gun shroud (2).

3. Unscrew the electrode (7) with the multi-tool (40). Hold the packing rod end (8h) to prevent it from turning, FIG. 24..

⚠ CAUTION

To avoid damaging the plastic threads, be very careful when installing the electrode.

4. Apply low-strength (purple) Loctite® or equivalent thread sealant to the electrode and packing rod threads. Install the electrode finger-tight. Do not overtighten.

5. Install the fluid nozzle, page 41.

6. Test gun resistance, page 30.

7. Install the gun shroud (2) and air cap, page 41.

8. Install the gun onto the manifold and bracket. See page 40.

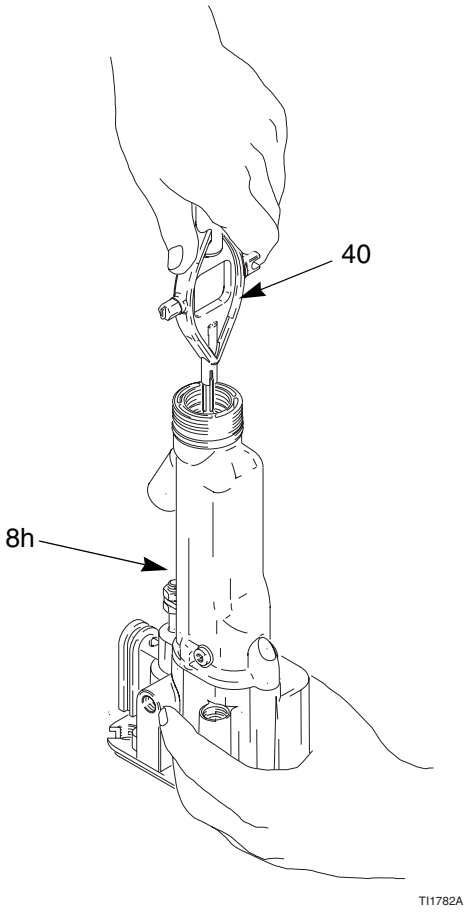


Fig. 24. Electrode Replacement

Fluid Packing Removal

NOTE: You may replace the packing rod as an assembly, as described below, or as individual parts (see page 44). The assembly is pre-adjusted at the factory.

1. Prepare the gun for service, page 39.

2. Remove the air cap, page 41. Remove the gun shroud (2).

3. Remove the jam nut (28) and actuator arm (29). See page 45.

NOTE: The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

4. Remove the fluid nozzle (4) and electrode (7). See pages 41 and 42.

5. Remove the packing rod (8), using the multi-tool (40).

⚠ CAUTION

Clean all parts in non-conductive solvent compatible with the fluid being used, such as xylol or mineral spirits. Use of conductive solvents can cause the gun to malfunction.

6. Check all parts for wear or damage and replace if necessary.

NOTE: Before installing the packing rod, clean the internal surface of the barrel (9) with a soft cloth or brush. Check for marks from high voltage arcing. If marks are present, replace the barrel.

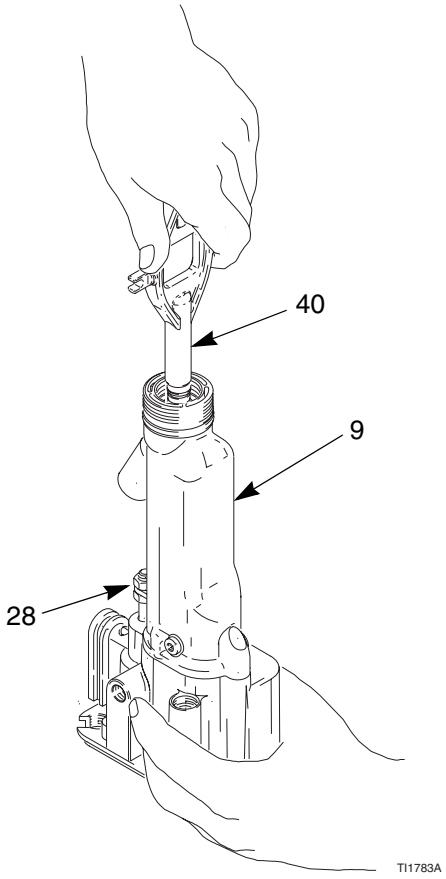


Fig. 25. Fluid Packing Removal

Packing Rod Repair

NOTE: You may replace the packing rod as individual parts, as described below, or as an assembly (see page 43). The assembly is pre-adjusted at the factory.

NOTE: Before installing the fluid packing rod into the gun barrel, make sure the internal surfaces of the barrel are clean. Remove any residue with a soft brush or cloth. Check the inside of the barrel for marks from high voltage arcing. If marks are present, replace the barrel.

To assemble the individual parts:

1. Place the packing nut (8e) and seal (8b) on the fluid rod (8h). Flats on the packing nut must face the back of the fluid rod. The seal o-ring must face away from the packing nut. See FIG. 26..

2. Fill the inner cavity of the spacer (8g) with dielectric grease. Place the spacer on the fluid rod (8h) in the direction shown. Generously apply dielectric grease to the outside of the spacer.

3. Place the rod packing (8d), packing spreader (8c), and housing (8f) on the packing rod (8h).

4. Lightly tighten the packing nut (8e). The packing nut is properly tightened when there is 3 lb (13.3 N) of drag force when sliding the packing housing (8f) assembly along the rod. Tighten or loosen the packing nut as needed.

5. Install the o-ring (8a) on the outside of housing (8f). Lubricate the o-ring with non-silicone grease, Part No. 111265. Do not over-lubricate.

6. Install the spring (25) against the nut (E) as shown.

7. Install the packing rod assembly (8) into the gun barrel. Using the multi-tool (40), tighten the assembly until just snug.

8. Install the electrode, page 42 and nozzle, page 41.

9. Install and adjust the actuator arm (29) and jam nut (28). See page 46.

10. Test gun resistance, page 30.

11. Install the gun shroud (2) and air cap, page 41.

12. Install the gun onto the manifold and bracket. See page 40.

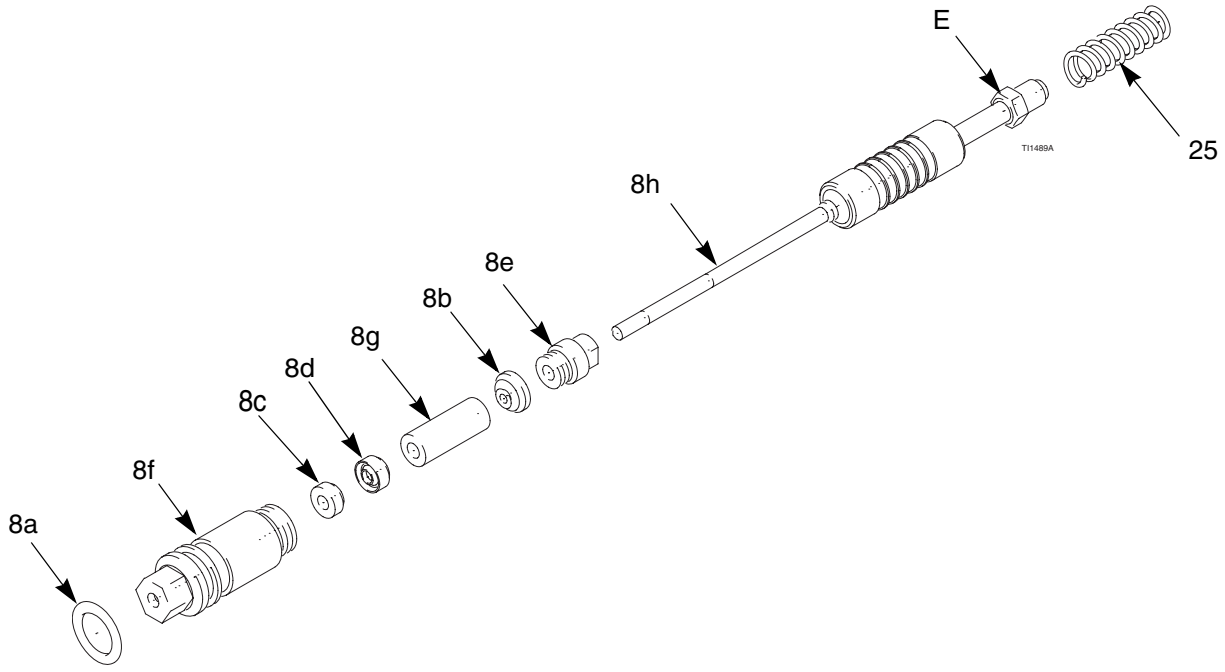


Fig. 26. Packing Rod

Piston Repair

1. Prepare the gun for service, page 39.

2. Remove the air cap, page 41. Remove the gun shroud (2).

3. Remove the jam nut (28), actuator arm (29), and adjustment nut (30). See FIG. 27..

NOTE: The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

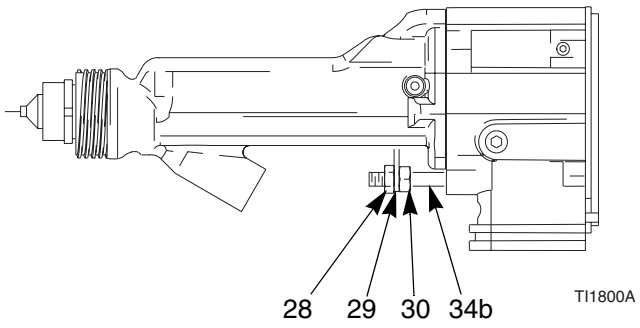


Fig. 27. Actuator Arm

4. Push on the piston rod (34b) to push the piston out the back of the gun.

5. Inspect the o-rings (34e, 34f, 34g) and u-cup packing (34d) for damage. See Table 5 and FIG. 28..

6. Lubricate the o-rings (34e, 34f, 34g) and u-cup packing (34d) with non-silicone grease, Part No. 111265. Do not over-lubricate.

7. Align the two stems (34c) with the holes in the gun body and press the piston assembly into the back of the gun until it bottoms.

8. Install and adjust the actuator arm, page 46.

Table 5: Piston O-Rings

Description	Function
Shaft O-Ring (34g)	Seals cylinder air along the piston rod (34b). Replace if air leaks along rod.
Front O-Ring (34e)	Air shutoff seal. Replace if air leaks from air cap when gun is de-triggered.
Back O-Ring (34f)	Separates cylinder air from fan and atomizing air.
U-Cup (34d)	Replace if air leaks from small vent hole at back of manifold when gun is triggered.

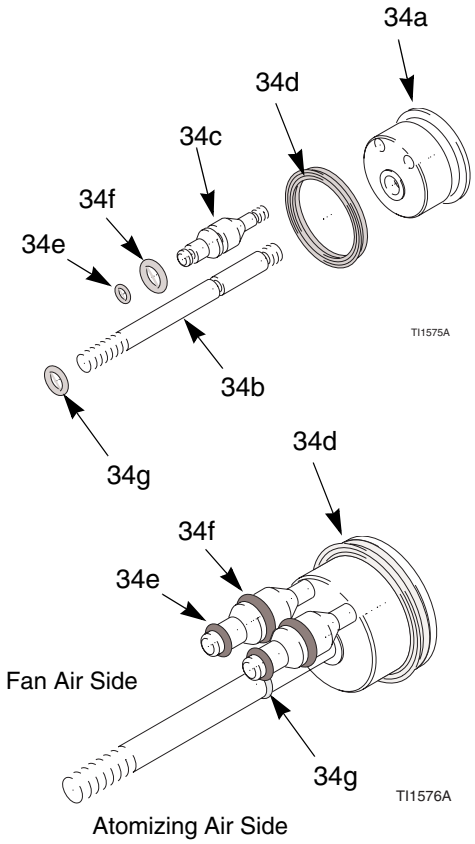


Fig. 28. Piston O-Rings

Adjust the Actuator Arm

NOTE: The fluid nozzle (4) must be in place when removing or installing the jam nut and actuator arm.

1. Install the adjustment nut (30), actuator arm (29), and jam nut (28) onto the piston rod (34b). Note that the jam nut (28) has a slightly larger hex and a thinner profile than the adjustment nut (30). See FIG. 27. on page 45.

2. Position the parts so there is a 0.125 in. (3 mm) gap between the actuator arm (29) and the fluid packing rod nut (E), which allows the atomizing air to actuate before the fluid. See FIG. 29..

3. Tighten the adjustment nut (30) against the actuator arm (29). Check that the 0.125 in. (3 mm) gap has been maintained. In addition, there should be 3-4 mm of electrode needle travel when the gun is triggered. Adjust the jam nut position to obtain these dimensions.

4. Test gun resistance, page 30.

5. Install the gun shroud (2) and air cap (3), page 41.

6. Install the gun onto the manifold and bracket. See page 40.

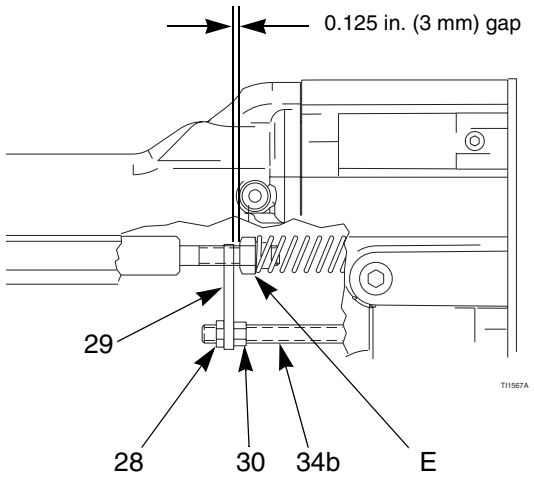


Fig. 29. Actuator Arm Adjustment

Barrel Removal

1. Prepare the gun for service, page 39.

2. Remove the air cap, page 41. Remove the gun shroud (2).

3. Carefully loosen the fluid fitting nut (20). Pull the tube (19) out of the fitting (23). Make sure both ferrules (21, 22) and the nut stay with the tube.

4. Remove the jam nut (28) and actuator arm (29). See page 45.

5. Loosen the three screws (10, 33). See FIG. 30..

⚠ CAUTION

To avoid damaging the power supply (12), pull the gun barrel (9) straight away from the gun body (32). If necessary, gently move the gun barrel from side to side to free it from the gun body.

6. Hold the gun body (32) with one hand and pull the barrel (9) straight off the body. See FIG. 30..

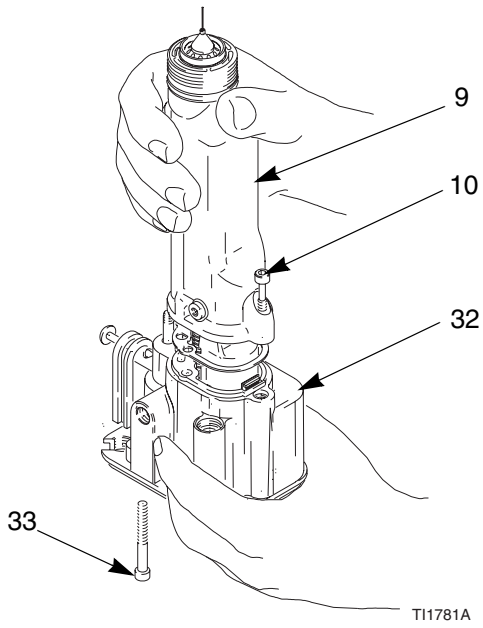


Fig. 30. Barrel Removal

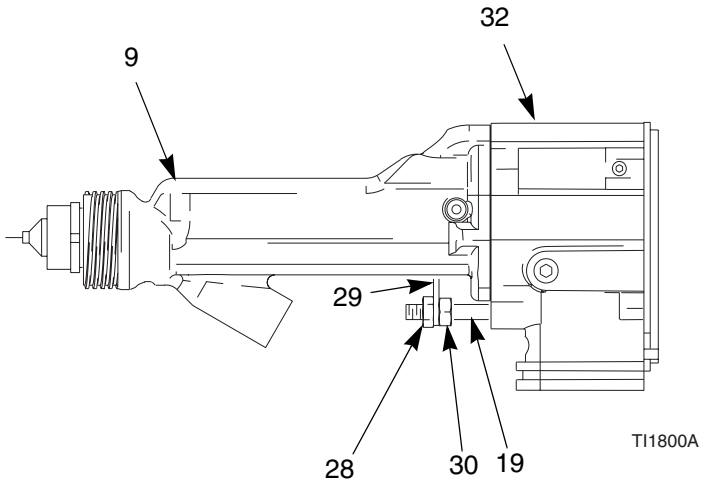


Fig. 31. Disconnect Fluid Tube

Barrel Installation

1. Be sure the gasket (11) and grounding spring (51) are in place. Make sure the air holes are aligned properly. Replace if damaged. See FIG. 32..
2. Place the barrel (9) over the power supply (12) and onto the gun body (32).
3. Tighten the three screws (10, 33) oppositely and evenly (about a half turn past snug).

⚠ CAUTION

Do not over-tighten the screws (10, 33).

4. Assemble the fluid tube (19) into the fluid fitting (23). Ensure that the ferrules (21, 22) are in place. Tighten the nut (20).
5. Install and adjust the actuator arm (29) and jam nut (28). See page 46.
6. Test gun resistance, page 30.
7. Install the gun shroud (2) and air cap, page 41.
8. Install the gun onto the manifold and bracket. See page 40.

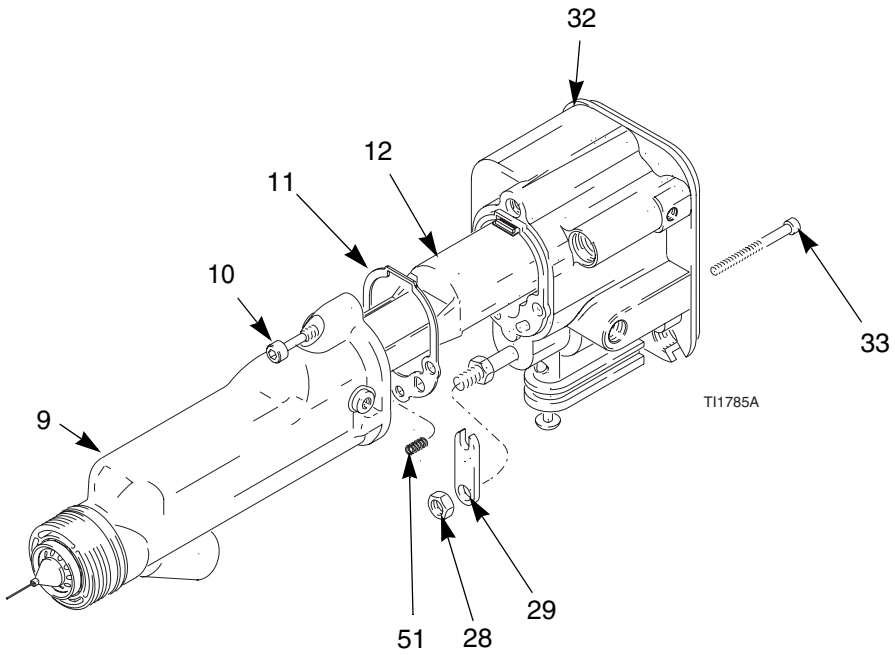


Fig. 32. Barrel Installation

Power Supply Removal and Replacement

- Inspect the gun body power supply cavity for dirt or moisture. Clean with a clean, dry rag.
- Do not expose gasket (11) to solvents.

1. Prepare gun for service, page 39.
2. Remove the barrel (9), page 47.

⚠ CAUTION

Be careful when handling the power supply (12) to avoid damaging it.

3. Grasp the power supply (12) with your hand. With a gentle side to side motion, free the power supply/alternator assembly from the gun body (32), then carefully pull it straight out. Disconnect the flexible circuit (39) from the socket at the top of the body (32). See FIG. 33., page 50.
4. Disconnect the 3-wire connector (GG) from the power supply. Slide the alternator up and off the power supply. Inspect the power supply and alternator for damage. Disconnect the 6-pin flexible circuit (39) from the power supply.
5. Check the power supply resistance, page 31. Replace if necessary.

Before installing the power supply, make sure the o-rings (12a, 13a), spring (12b), and pads (13e) are in place.

6. Connect the 6-pin flexible circuit (39) to the power supply.
7. Connect the 3-wire connector (GG). Slide the alternator (13) down onto the power supply (12).
8. Lubricate the alternator o-ring (13a) with non-silicone grease, Part No. 111265. Do not over-lubricate.
9. Lubricate the power supply o-ring (12a) with dielectric grease.
10. Insert the power supply/alternator assembly in the gun body (32). Make sure the ground strips make contact with the body. Connect the flexible circuit (39) to the socket at the top of the body. Push the 6-pin connector into the socket to ensure it is properly connected.
11. Install the barrel (9), page 48.
12. Test gun resistance, page 30.

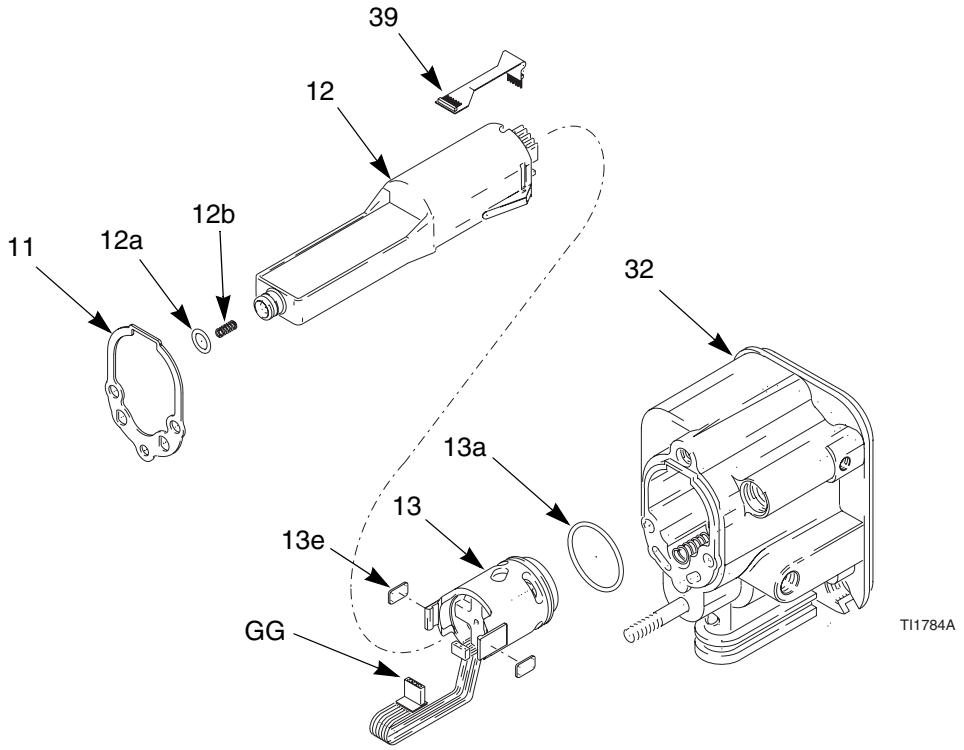


Fig. 33. Power Supply

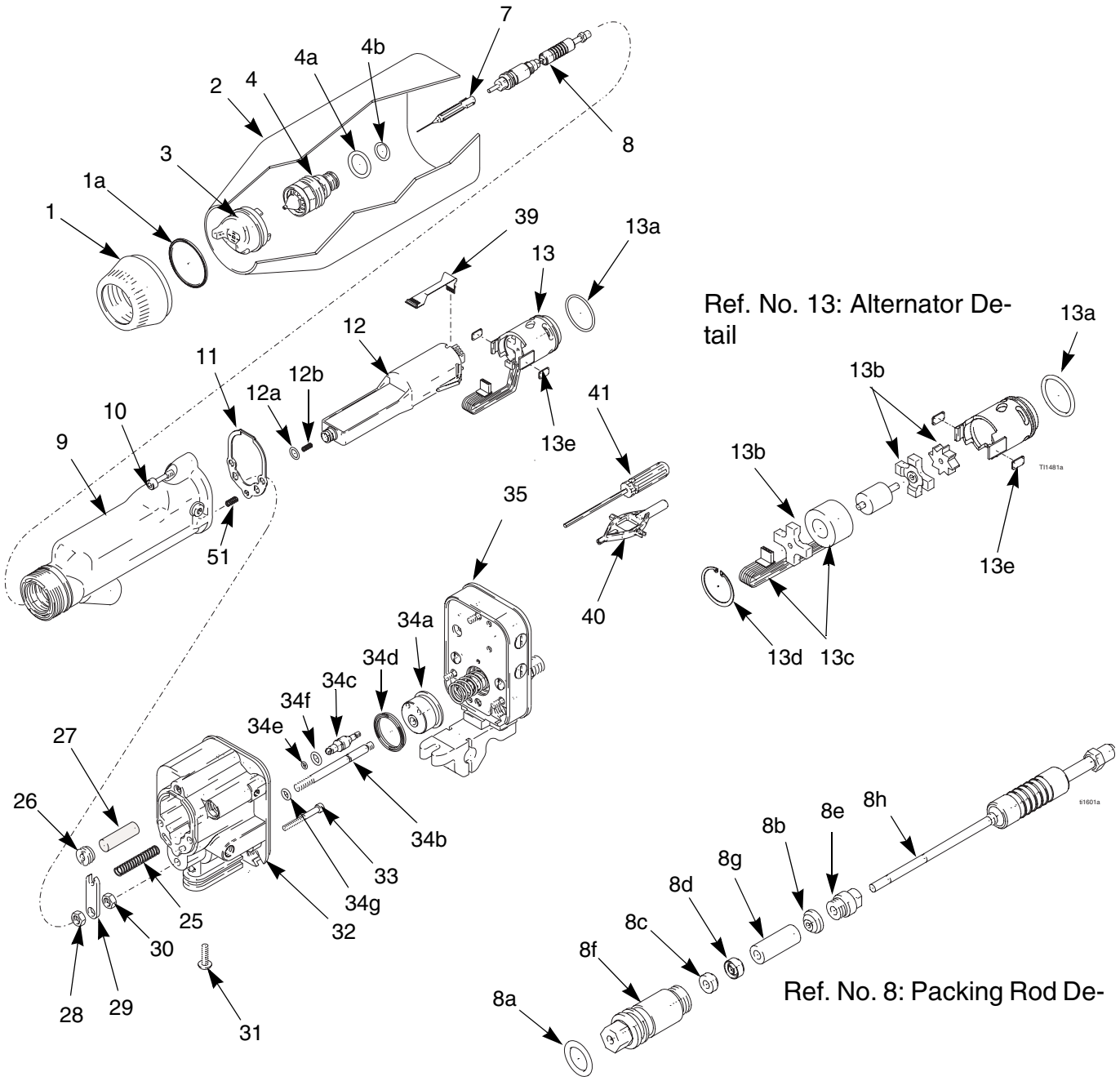
Turbine Alternator Removal and Replacement

NOTE: Replace turbine alternator bearings after 2000 hours of operation. Order Part No. 223688 Bearing Kit.

1. Prepare gun for service, page 39.
2. Remove the power supply/alternator assembly, page 49.
3. Disconnect the alternator from the power supply, page 49.
4. Measure resistance between the two outer terminals of the 3-wire connector (GG); it should be 2.5-3.5 ohms. If outside this range, replace the alternator coil.
5. Follow the bearing replacement procedure in the bearing kit manual 308034.
6. Install the alternator on the power supply, page 49.
7. Install the power supply/alternator assembly, page 49.

Parts

Part No. 244591 PRO Auto Xs Electrostatic Gun, Series A, for waterborne coatings



Part No. 244591 PRO Auto Xs Electrostatic Gun, Series A, for waterborne coatings

Ref. No.	Part No.	Description	Qty
1	244950	RING, retaining, air cap; includes 1a	1
1a*†	198307	. U-CUP	1
2	245325	SHROUD	1
3	24A276	AIR CAP	1
4	197266	NOZZLE; 1.5 mm orifice; includes 4a and 4b	1
4a	111261	. O-RING, conductive	1
4b	111507	. O-RING; fluoroelastomer	1
5	198486	CONNECTOR, tube, fiber optic; see page 55 (unassembled)	1
7	276867	NEEDLE, electrode, WB	1
8	244521	ROD, packing; includes 8a-8h	1
8a*	111316	. O-RING; fluoroelastomer	1
8b*	116905	. SEAL	1
8c*	178409	. SPREADER, packing; uhmwpe	1
8d*	178763	. PACKING, rod; acetal	1
8e	197641	. NUT, packing	1
8f	185495	. HOUSING, packing	1
8g*	186069	. SPACER, packing; acetal	1
8h	244696	. ROD, packing	1
9	244394	BARREL, gun	1
10	197518	SCREW; socket-hd; 10-24 x 3/4 in. (19 mm)	1
11*†	197517	GASKET, barrel	1
12	244542	POWER SUPPLY, 60 kV; includes 12a-12b	1
12a*†	103337	. O-RING; fluoroelastomer	1
12b	197624	. SPRING, compression	1
13	244555	TURBINE, alternator; includes 13a-13e	1
13a*†	110073	. O-RING; fluoroelastomer	1
13b	223688	. BEARING KIT; includes front and rear bearings and fan	1
13c	244577	. COIL	1
13d	111745	. RING, retaining	1
13e	198821	. PAD, pressure	2
15	107460	TOOL, wrench, ball end (not shown)	1
16	179791	TAG, warning (not shown); replacement available at no cost	1
17	186118	SIGN, warning (not shown); replacement available at no cost	1
19	197624	SPRING, grounding	1
25	185111	SPRING, compression	1
26	189367	CAP, exhaust	1
27	185122	MUFFLER	1
28	101324	NUT, jam, hex	1
29	197919	ARM, actuator	1
30	102025	NUT, hex	1
31	112689	SCREW, button-hd; 1/4-20 x 3/4 in. (19 mm)	1
32	198363	BODY, gun, auto, WB	1
33	116575	SCREW, cap, socket-hd; 10-24; 3 in. (76 mm)	2
34	244702	PISTON; includes 34a-34g	1
34a	197920	. PISTON	1
34b	189754	. ROD, piston	1
34c	189355	. STEM, piston	2
34d*†	189752	. PACKING, u-cup	1
34e*†	111504	. O-RING	2
34f*†	112319	. O-RING	2
34g*†	111508	. O-RING	1

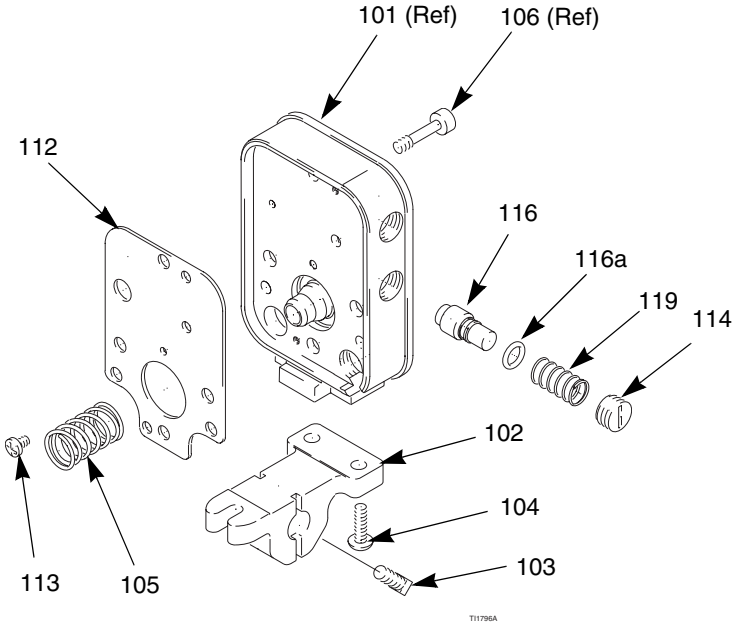
Ref. No.	Part No.	Description	Qty
35	244938	MANIFOLD; see separate parts list on page 55	1
37	245265	CIRCUIT, flexible	1
39	276741	MULTI-TOOL	1
40	189888	COVER, gun; box of 10 (not shown)	1
42	116553	TUBE, grease, lubricant	1
48	290171	SIGN, warning (not shown); replacement available at no cost	1
56	24A431	KIT, wide pattern	1

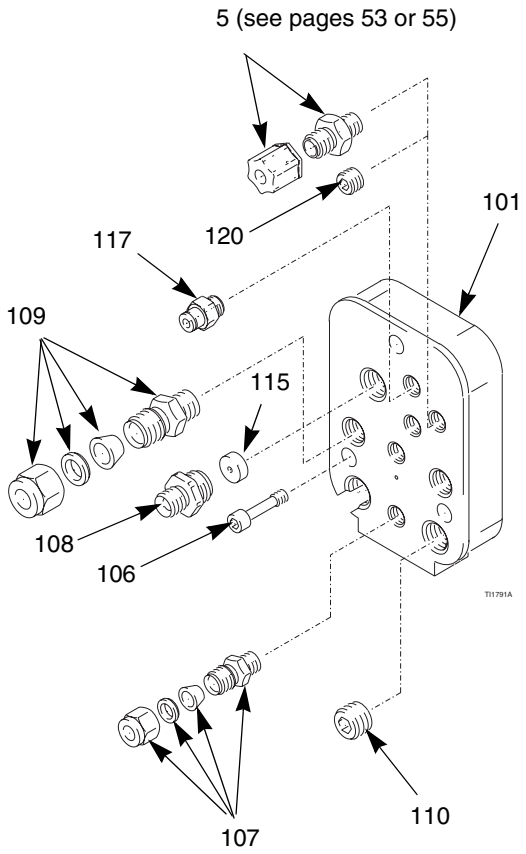
* Recommended spare parts. Keep on hand to reduce downtime.

† Included in repair kit 15D592.

NOTE: Replacement Warning labels, signs, tags, and cards are available at no cost.

Part No. 244938 Manifold, Series A





Ref. No.	Part No.	Description	Qty
101	198362	MANIFOLD	1
102	189581	BRACKET, reciprocator	1
103	110465	SCREW, set	2
104	112689	SCREW, button-hd	2
105	112640	SPRING, compression	1
106	197518	SCREW; socket-hd; 10-24 x 3/4 in. (19 mm)	3
107	111157	FITTING, tube	1
108	186845	FITTING, turbine	1
109	110078	FITTING, tube, fluid	2
110	112646	PLUG	1
112†	197925	GASKET, manifold	1
113	108290	SCREW, machine	2
114	189365	CAP, kV, HI/LO	2

Ref. No.	Part No.	Description	Qty
115	198764	RESTRICTOR	1
116	244772	PISTON; includes 116a	2
116a†	112085	. O-RING	1
117	114263	FITTING, connector	3
119	116621	SPRING, compression	2
120	112645	PLUG	1

† Included in repair kit 15D592.

Accessories

Air Line Accessories

Grounded Air Hose (Red Cover)

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

0.315 in. (8 mm) ID; 1/4 npsm(f) x 1/4 npsm(f) left-hand thread; red cover with stainless steel braid ground path.

235068 6 ft (1.8 m)
235069 15 ft (4.6 m)
235070 25 ft (7.6 m)
235071 36 ft (11 m)
235072 50 ft (15 m)
235073 75 ft (23 m)
235074 100 ft (30.5 m)

Bleed-Type Master Air Valve

300 psi (21 bar, 2.1 MPa) Maximum Working Pressure

Relieves air trapped in the air line between this valve and the pump air motor when closed.

107141 3/4 npt

Air Line Shutoff Valve

150 psi (10 bar, 1.0 MPa) Maximum Working Pressure

For turning air to gun on or off.

224754 1/4 npsm(m) x 1/4 npsm(f) left-hand thread.

Fluid Line Accessories

Shielded Waterborne Fluid Hose

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

PTFE; 1/4 in. (6 mm) ID

245327 25 ft (7.6 m)
245328 36 ft (11 m)

Unshielded Waterborne Fluid Hose

100 psi (7 bar, 0.7 MPa) Maximum Working Pressure

PTFE; 1/4 in. (6 mm) ID. See manual 308688 for installation requirements.

245329 25 ft (7.6 m)
245330 36 ft (11 m)

Fluid Shutoff/Drain Valve

500 psi (35 bar, 3.5 MPa) Maximum Working Pressure

For turning fluid on or off to the gun and for relieving fluid line pressure at the pump.

208630 1/2 npt(m) x 3/8 npt(f); carbon steel and PTFE; for non-corrosive fluids

Drain Valve

300 psi (21 bar, 2.1 MPa) Maximum Working Pressure

236853 Mounts directly to gun manifold for faster flushing and color changes. Must be used with 233676 Fluid Recirculation Kit.

Miscellaneous Accessories

Ground Wire and Clamp

222011 For grounding pump and other components and equipment in the spray area. 12 gauge, 25 ft (7.6 m).

Megohmmeter

241079 500 Volt output; 0.01-2000 megohms. ***Not for use in hazardous areas.***

Grounding Rod

210084 Use to discharge voltage from voltage isolation system enclosure.

Safety Warning Signs

180060 English Warning Sign. FM Approved. Available at no charge from Graco.

ES Display Module

224117 Receives fiber optic transmission from the PRO Auto Xs gun and displays the gun's output voltage and current. Mounts in a standard 19 in. DIN rack. See 308265.

Power Supply

235301 Supplies low voltage DC power to 224117 Display Module. See 308265.

Fiber Optic Y Cables

See item T in FIG. 3. on page 11. For use with 224117 Display Module only. Connect gun manifold and display module, or bulkhead connector and display module. See 308265.

224682 25 ft (7.6 m)
224684 50 ft (15 m)
224686 100 ft (30.5 m)

Remote Voltage Display

189762 Battery-operated meter displays actual spraying voltage. remote mount outside hazardous area. Connects to gun via fiber optic cable. See 308265.

Remote Voltage Display Kits

Include 189762 Remote Voltage Display and fiber optic cable.

236917 25 ft (7.6 m)
236919 50 ft (15 m)
236921 100 ft (30.5 m)

Fiber Optic Cables

See item V in FIG. 3. on page 11. Connect gun manifold and remote voltage display, bulkhead connector and remote display, or bulkhead connector and gun manifold. See 308265.

224672 25 ft (7.6 m)
224674 50 ft (15 m)
224676 100 ft (30.5 m)

Bulkhead Connector

189870 For connecting two fiber optic cables.

Gun Accessories

Round Pattern Kits

Consists of fluid tip, diffuser and air cap.

245217 4-6 in. (102-152 mm) diameter
245219 8-10 in. (203-254 mm) diameter

Dielectric Grease

116553 1 oz (28 g) tube of dielectric grease for the power supply o-ring (12a), some packing rod parts (8), and certain fluid fittings.

Gun Valve Lubricant

111265 4 oz (113 g) tube of sanitary (non-silicone) lubricant for fluid seals and wear areas.

Alternator Bearing Kit

223688 To repair the turbine alternator.

Cleaning Brush

105749 For cleaning air cap and fluid nozzle.

Technical Data

Category	Data
Maximum Working Fluid Pressure	100 psi (0.7 MPa, 7 bar)
Maximum Working Air Pressure	100 psi (0.7 MPa, 7 bar)
Minimum Air Pressure at Gun Inlet	40 psi (0.28 MPa, 2.8 bar)
Maximum Fluid Operating Temperature	120°F (48°C)
Short Circuit Current Output	125 microamperes
Voltage Output	30-60 kV
Sound Power (measured per ISO Standard 9216)	at 40 psi (0.28 MPa, 2.8 bar): 90.4 dB(A) at 100 psi (0.7 MPa, 7 bar): 105.4 dB(A)
Sound Pressure (measured 1 m from gun)	at 40 psi (0.28 MPa, 2.8 bar): 87 dB(A) at 100 psi (0.7 MPa, 7 bar): 99 dB(A)
Turbine air inlet fitting, left-hand thread	1/4 npsm(m)
Atomizing air inlet fitting	3/8 in. OD nylon tube
Fan air inlet fitting	3/8 in. OD nylon tube
Cylinder air inlet fitting	5/32 in. OD nylon tube
Hi/Lo voltage selector air inlet fittings	5/32 in. OD nylon tube
Fluid inlet fitting	custom
Gun Weight	3.52 lb (1.6 kg)
Gun Length	12.25 in. (31.1 cm)
Wetted Parts	Stainless Steel; Nylon, Acetal, Ultra-High Molecular Weight Polyethylene, Fluoroelastomer, PEEK, Tungsten Wire, Polyethylene

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Graco Standard Warranty

Graco warrants all equipment manufactured by Graco and bearing its name to be free from defects in material and workmanship on the date of sale to the original purchaser for use. With the exception of any special, extended, or limited warranty published by Graco, Graco will, for a period of twelve months or two thousand hours of operation from the date of sale, repair or replace any part of the equipment determined by Graco to be defective. However, any deficiency in the gun barrel, gun body, manifold, mounting bracket, internal power supply, and alternator (excluding turbine bearings) will be repaired or replaced for thirty-six months or six thousand hours of operation from the date of sale. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for general wear and tear, or any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility of Graco equipment with structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective to an authorized Graco distributor for verification of the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor, and transportation.

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Original instructions. This manual contains English. MM 309457

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